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UMASS/AMHERST

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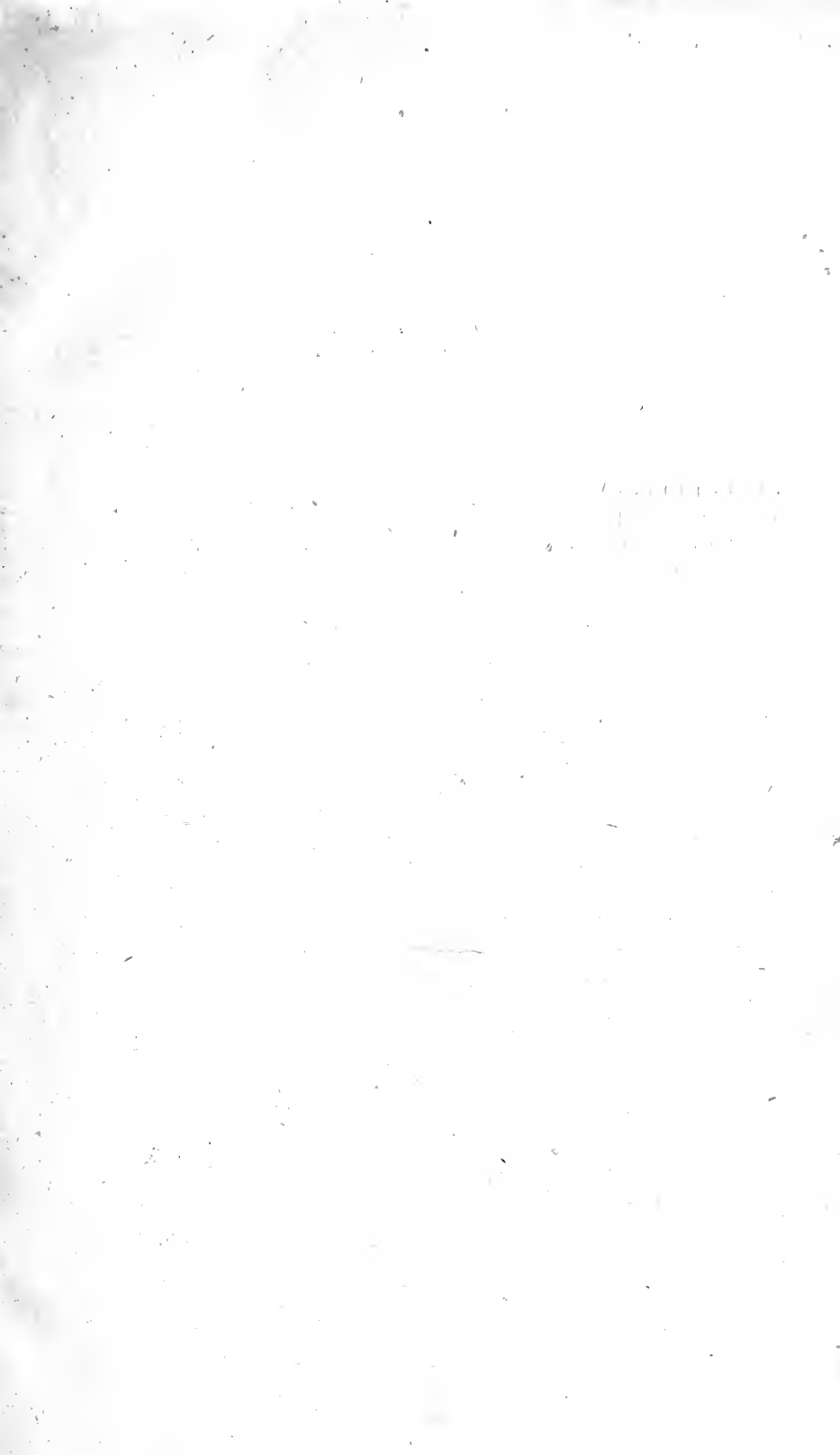


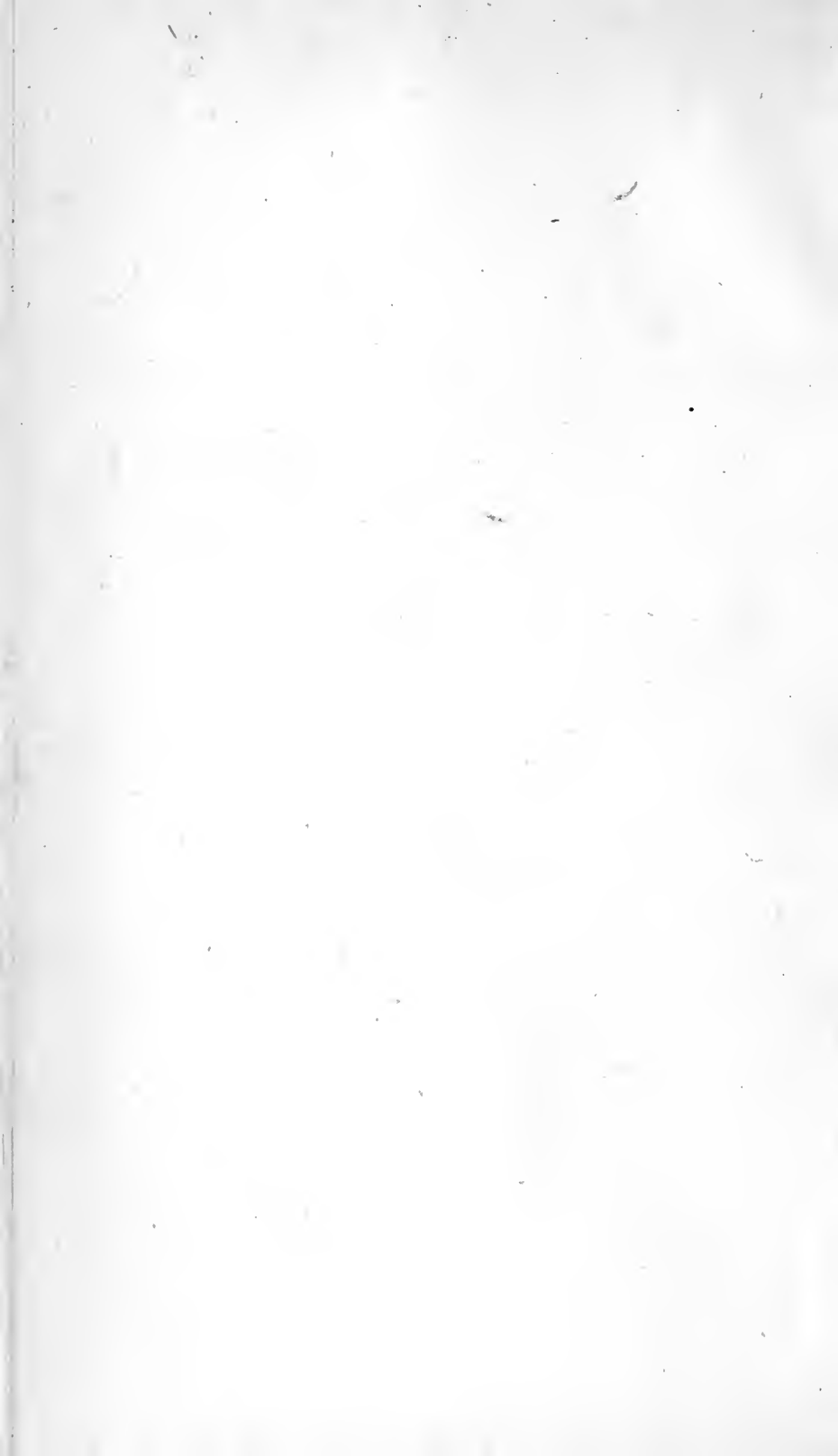
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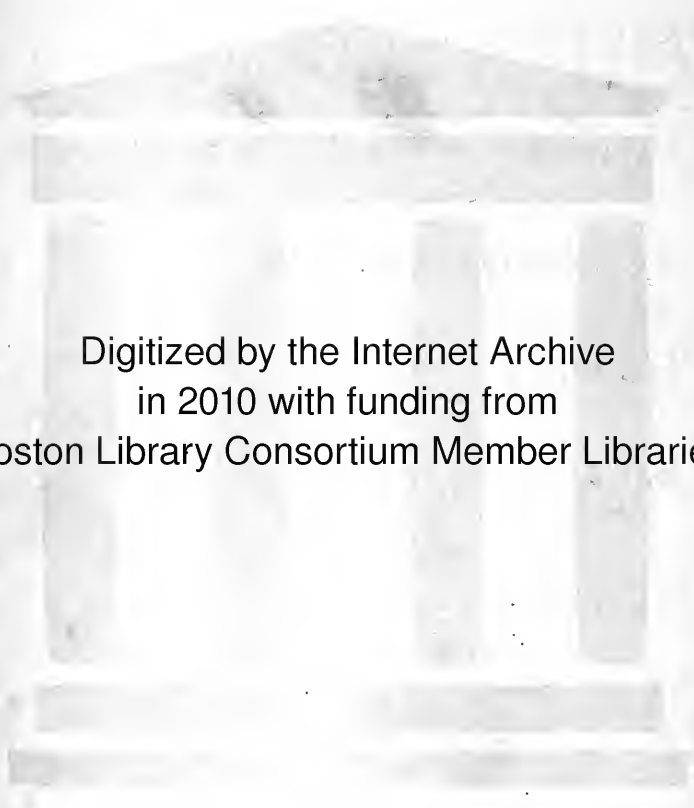




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THE M. A. C. BULLETIN

AMHERST, MASS.

Vol VI. No. 1.

For January, 1914

Published Six Times a Year by the College.

Jan., Feb., Mar., May, Sept., Oct.

ENTERED AS SECOND-CLASS MAIL MATTER AT THE POST OFFICE, AMHERST, MASS.

Public Document

No. 31

CATALOGUE

OF THE

MASSACHUSETTS

AGRICULTURAL COLLEGE,

1913-1914.

FIFTY-FIRST ANNUAL REPORT.
PART II.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
32 DERNE STREET.
1914.

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Without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. — *Act of Congress, July 2, 1862.*

MASSACHUSETTS AGRICULTURAL COLLEGE, AMHERST.

CATALOGUE, 1913-1914.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
32 DERNE STREET.
1914.

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APPROVED BY
THE STATE BOARD OF PUBLICATION.

THE MASSACHUSETTS
AGRICULTURAL COLLEGE.

This issue of the catalogue represents the status of the college for the current college year, with provisional announcement of courses of study and other matters for the year to follow.

The college reserves, for itself and its departments, the right to withdraw or change the announcements made in its catalogue. Special publication will be made should it become necessary on account of important changes.

CALENDAR.

1914-15.

REGULAR COURSES.

1914.

January 5, Monday, 1 P.M.,	Winter recess ends; regular schedule of classes.
January 23, Friday, 8 A.M.,	Semester examinations begin.
February 2, Monday, 1 P.M.,	Second semester begins; regular schedule of classes.
February 23, Monday forenoon,	Half holiday, observance of Washington's Birthday.
March 27, Friday, 5 P.M.,	Spring recess begins.
April 6, Monday, 1 P.M.,	Spring recess ends; regular schedule of classes.
April 20, Monday forenoon,	Half holiday, observance of Patriots' Day.
May 30, Saturday,	Holiday, Memorial Day.
June 1, Monday, 8 A.M.,	Senior and junior examinations begin.
June 6, Saturday, 8 A.M.,	Sophomore and freshman examinations begin.
June 13-17, Saturday-Wednesday,	Commencement.
June 18-20, Thursday-Saturday,	Entrance examinations.
September 2-5, Wednesday-Saturday,	Entrance examinations.
September 9, Wednesday, 1.30 P.M.,	First semester begins; chapel.
October 12, Monday forenoon,	Half holiday, Columbus Day.
November 25-November 30, Wednesday, 12 M.-Monday 1 P.M.,	Thanksgiving recess; regular schedule of classes.
December 18, Friday, 5 P.M.,	Winter recess begins.

1915.

January 4, Monday, 1 P.M.,	Winter recess ends; regular schedule of classes.
January 22, Friday, 8 A.M.,	Semester examinations begin.
February 1, Monday, 1 P.M.,	Second semester begins; regular schedule of classes.
February 22, Monday forenoon,	Half holiday, Washington's Birthday.
March 26, Friday, 5 P.M.,	Spring recess begins.
April 5, Monday, 1 P.M.,	Spring recess ends; regular schedule of classes.
April 19, Monday forenoon,	Half holiday, Patriots' Day.
May 31, Monday,	Holiday, observance of Memorial Day.
June 1, Tuesday, 8 A.M.,	Senior and junior examinations begin.
June 5, Saturday, 8 A.M.,	Sophomore and freshman examinations begin.
June 12-16, Saturday-Wednesday,	Commencement.
June 17-19, Thursday-Saturday,	Entrance examinations.

MASSACHUSETTS AGRICULTURAL COLLEGE.

HISTORY.—The Massachusetts Agricultural College was among the first of those organized under the national land grant act of 1862. This act granted public lands to the several States and Territories, the funds realized from the sale of which should be used to establish colleges of agriculture and mechanic arts; the bill was framed by the late Senator Justin Smith Morrill of Vermont. The Legislature of Massachusetts has granted money for the erection of nearly all the buildings now on the grounds, and makes annual appropriations for the maintenance of the college.

The college was incorporated in 1863, and on the 2d of October, 1867, was formally opened to its first class of students. At that time four buildings had been erected, and there were four regular instructors employed by the institution. In 1882 the State located its agricultural experiment station on the grounds of the college. Later, after the federal law was passed granting financial aid to experiment stations, the Massachusetts Agricultural Experiment Station was consolidated with the federal station, and subsequently the whole was incorporated with the college.

COURSES.—The college offers an education without tuition fee to any student who is a resident of Massachusetts and who meets the requirements for admission. Women are admitted on the same basis as are men. Students who are not residents of Massachusetts are required to pay a nominal tuition fee. The four-years' course leads to the degree of bachelor of science, and the graduate school offers advanced courses leading to the degrees of master of science and doctor of philosophy. The winter school of ten weeks, for admission to which no scholastic requirements are made, is held each winter, beginning early in January. There are other short courses at the college, such as the beekeepers' course and summer school. Various forms of extension teaching are carried on away from the college, such as correspondence courses, traveling schools, educational exhibits, lecture courses, demonstrations, and circulating libraries.

PURPOSE OF THE COLLEGE.—The chief purpose of the college is to prepare men and women for the agricultural vocations. In this statement the term "agricultural vocations" is used in its broadest sense. Courses are offered which give efficient training in various agricultural pursuits, such as general farming, dairying, management of estates, poultry husbandry, fruit growing, market gardening, landscape gardening and forestry. Students are also fitted for positions in institutions designed for investigation in many sciences underlying the great agricultural industry, for teaching in agricultural colleges and high schools, for scientific experts in chemistry, entomology,

¹ Twenty-six teaching departments offer instruction in agriculture, horticulture, sciences, the humanities and rural social science. A system of major courses permits a student to elect work in 1 of 14 departments and to specialize in that and allied subjects for a period of two years.

botany and microbiology and for business operations having connection with practical agriculture.

Though the agricultural vocations are thus the chief concern of the college, students also find the course one that fits them admirably for pursuits in which the sciences, particularly chemistry, botany and zoölogy, are an essential preparation. Still other students find the course a desirable education, without regard to future occupation. The course of study is designed to give a student a general college education, and in addition to make it possible for him to specialize in any department in which a major course is offered.

LOCATION AND EQUIPMENT. — The agricultural college is located in the town of Amherst. The grounds comprise more than 600 acres, lying about a mile north of the village center. The equipment of the college, both in buildings and facilities for instruction, is excellent. Amherst is about 98 miles from Boston, and may be reached over the Central Massachusetts division of the Boston & Maine Railroad, or by way of the Central Vermont Railroad. Electric car lines connect Amherst with Northampton, Holyoke and Springfield.

THE MASSACHUSETTS AGRICULTURAL EXPERIMENT STATION.

Massachusetts provided for the establishment of an agricultural experiment station in 1882. This station, though on the college grounds and supported by the State, was then without organic connection with the college. Under an act of Congress, passed in 1887, an agricultural experiment station was established as a department of the college, and was supported by the general government. For a time, therefore, Massachusetts had two experiment stations at the college. In 1894 these were combined, and the station reorganized as a department of the college. It is now supported by funds from both the State and the general government. In 1906 the general government largely increased its support of experiment stations, on condition, however, that the money thus provided should be used only for research. The station now receives about one-third of its support from the State.

The station is under the direct supervision of the Board of Trustees. The chief officer is the director, who is responsible to the president and to a committee of the Board. The station is organized into a number of departments, all co-operating toward the betterment of agriculture. In most cases the heads of the station departments are heads of corresponding departments in the college. The work of the station takes three directions; namely, control work, experimentation and investigation. The station publishes numerous bulletins and two annual reports, one scientific, the other for practical farmers and for general distribution. These publications, conveying information as to results of experiments, are free, and circulate extensively, the mailing list containing some 20,000 addresses.

THE CORPORATION.

MEMBERS OF THE CORPORATION.

	TERM EXPIRES
CHARLES E. WARD of Buckland,	1914
ELMER D. HOWE of Marlborough,	1914
NATHANIEL I. BOWDITCH of Framingham,	1915
WILLIAM WHEELER of Concord,	1915
ARTHUR G. POLLARD of Lowell,	1916
CHARLES A. GLEASON of New Braintree,	1916
FRANK GERRETT of Greenfield,	1917
HAROLD L. FROST of Arlington,	1917
CHARLES H. PRESTON of Danvers,	1918
FRANK A. HOSMER of Amherst,	1918
DAVIS R. DEWEY of Cambridge,	1919
GEORGE P. O'DONNELL of Northampton,	1919
WILLIAM H. BOWKER of Concord,	1920
GEORGE H. ELLIS of West Newton,	1920

MEMBERS EX OFFICIO.

His Excellency Governor DAVID I. WALSH, *President of the Corporation.*
 KENYON L. BUTTERFIELD, *President of the College.*
 DAVID SNEDDEN, *State Commissioner of Education.*
 WILFRID WHEELER, *Secretary of the State Board of Agriculture.*

OFFICERS OF THE CORPORATION.

His Excellency Governor DAVID I. WALSH, of Boston, *President.*
 CHARLES A. GLEASON of New Braintree, *Vice-President.*
 WILFRID WHEELER of Concord, *Secretary.*
 FRED C. KENNEY of Amherst, *Treasurer.*
 CHARLES A. GLEASON of New Braintree, *Auditor.*

STANDING COMMITTEES OF THE CORPORATION.¹

Committee on Finance.

CHARLES A. GLEASON, <i>Chairman.</i>	ARTHUR G. POLLARD.
GEORGE H. ELLIS.	CHARLES E. WARD.
NATHANIEL I. BOWDITCH.	FRANK A. HOSMER.

Committee on Course of Study and Faculty.

WILLIAM WHEELER, <i>Chairman.</i>	DAVID SNEDDEN.
WILLIAM H. BOWKER.	ELMER D. HOWE.
FRANK A. HOSMER.	DAVIS R. DEWEY.
	GEORGE P. O'DONNELL.

Committee on Farm.

NATHANIEL I. BOWDITCH, <i>Chairman.</i>	CHARLES A. GLEASON.
FRANK GERRETT.	GEORGE H. ELLIS.

¹ The president of the college is *ex officio* member and secretary of standing committees.

Committee on Horticulture.

WILFRID WHEELER, *Chairman*.
DAVIS R. DEWEY.

ELMER D. HOWE.
HAROLD L. FROST.

Committee on Experiment Department.¹

CHARLES H. PRESTON, *Chairman*.
WILFRID WHEELER.

ARTHUR G. POLLARD.
CHARLES E. WARD.
HAROLD L. FROST.

Committee on Buildings and Arrangement of Grounds.

WILLIAM H. BOWKER, *Chairman*.
WILLIAM WHEELER.

FRANK GERRETT.
CHARLES H. PRESTON.
GEORGE P. O'DONNELL.

Committee on Extension Service.

ELMER D. HOWE, *Chairman*.
GEORGE H. ELLIS.

CHARLES E. WARD.
WILFRID WHEELER.
HAROLD L. FROST.

Examining Committee of Overseers from the State Board of Agriculture.

JOHN BURSLEY of West Barnstable.
FRANK P. NEWKIRK of Easthampton.
WILLIAM E. PATRICK of Warren.
JOHN J. ERWIN of Wayland.
R. HENRY RACE of North Egremont.

¹ The director of the experiment station is a member of the committee on experiment department, without vote.

OFFICERS OF THE INSTITUTION.

[The names of the faculty are arranged in groups according to rank. Within these groups, the order depends upon seniority of service in the college, not upon seniority of appointment to the position now held.]

THE FACULTY.

KENYON L. BUTTERFIELD, ¹ A.M., LL.D.,	President's House.
President of the College and Head of Division of Rural Social Science.	
GEORGE F. MILLS, A.M.,	46 Amity Street.
Dean of the College and Professor of Languages and Literature.	
CHARLES H. FERNALD, Ph.D.,	3 Hallock Street.
Honorary Director of the Graduate School.	
WILLIAM P. BROOKS, Ph.D.,	5 Farview Way.
Director of the Experiment Station and Lecturer on Soil Fertility.	
WILLIAM D. HURD, M.Agr.,	82 Pleasant Street.
Director of the Extension Service.	
CHARLES E. MARSHALL, Ph.D.,	Sunset Avenue.
Director of the Graduate School and Professor of Microbiology.	
FRANK A. WAUGH, M.Sc.,	Campus.
Head of Division of Horticulture and Professor of Landscape Gardening.	
JAMES A. FOORD, M.Sc.Agr.,	Lincoln Avenue.
Head of Division of Agriculture and Professor of Farm Administration.	
ROBERT J. SPRAGUE, Ph.D.,	Mount Pleasant.
Head of Division of the Humanities and Professor of Economics and Sociology.	
JOSEPH B. LINDSEY, Ph.D.,	47 Lincoln Avenue.
Goessmann Professor of Chemistry.	
CHARLES WELLINGTON, Ph.D.,	34 Amity Street.
Professor of Chemistry.	
JAMES B. PAIGE, B.Sc., D.V.S.,	42 Lincoln Avenue.
Professor of Veterinary Science.	
GEORGE E. STONE, Ph.D.,	Mount Pleasant.
Professor of Botany.	
PHILIP B. HASBROUCK, B.Sc.,	130 Pleasant Street.
Professor of Physics and Registrar of the College.	
JOHN E. OSTRANDER, A.M., C.E.,	33 North Prospect Street.
Professor of Mathematics and Civil Engineering.	
HENRY T. FERNALD, Ph.D.,	44 Amity Street.
Professor of Entomology, Chairman of Division of Science.	
GEORGE C. MARTIN, C.E., Captain 18th U. S. Infantry,	Amherst House.
Professor of Military Science and Tactics.	
— — — — — ²	— — — — —
Professor of Floriculture.	
WILLIAM R. HART, A.M., L.B.,	97 Pleasant Street.
Professor of Agricultural Education.	
FRED C. SEARS, M.Sc.,	Mount Pleasant.
Professor of Pomology.	
FRED C. KENNEY,	Mount Pleasant.
Treasurer of the College.	

¹ On leave of absence; Associate Dean Lewis serving as acting president.

² Position being filled temporarily by Mr. Edward J. Canning of Northampton.

JOSEPH S. CHAMBERLAIN, Ph.D.,	Mount Pleasant.
Professor of Organic and Agricultural Chemistry.	
WILLIAM P. B. LOCKWOOD, M.Sc.,	7 East Pleasant Street.
Professor of Dairying.	
JOHN C. GRAHAM, B.Sc.,	Lincoln Avenue.
Professor of Poultry Husbandry.	
EDWARD M. LEWIS, A.M.,	Lincoln Avenue and Gaylord Street.
Associate Dean of the College and Professor of Literature.	
WILLIAM D. CLARK, A.B., M.F.,	25 North Prospect Street.
Professor of Forestry.	
SIDNEY B. HASKELL, B.Sc.,	5 Fearing Street.
Associate Professor of Agronomy.	
ROBERT W. NEAL, ¹ A.M.,	— —
Associate Professor of English.	
CLARENCE E. GORDON, Ph.D.,	38 Lincoln Avenue.
Associate Professor of Zoölogy and Geology.	
ALEXANDER E. CANCE, Ph.D.,	9 Fearing Street.
Associate Professor of Agricultural Economics.	
ELMER K. EYERLY, A.M.,	52 Amity Street.
Associate Professor of Rural Sociology.	
JOHN A. McLEAN, A.B., B.Sc.Agr.,	Lincoln Block.
Associate Professor of Animal Husbandry.	
G. CHESTER CRAMPTON, Ph.D.,	86 Pleasant Street.
Associate Professor of Entomology.	
CHARLES A. PETERS, Ph.D.,	South Sunset Avenue.
Associate Professor of Inorganic and Soil Chemistry.	
GEORGE E. GAGE, Ph.D.,	27 Sunset Avenue.
Associate Professor of Animal Pathology.	
A. VINCENT OSMUN, M.Sc.,	5 Kendrick Place.
Assistant Professor of Botany.	
EDGAR L. ASHLEY, A.M.,	Prospect House.
Assistant Professor of German.	
ANDERSON A. MACKIMMIE, A.B.,	Pine Street, North Amherst.
Assistant Professor of French.	
BURTON N. GATES, Ph.D.,	42 Lincoln Avenue.
Assistant Professor of Beekeeping.	
CURRY S. HICKS, B.Pd.,	8 Allen Street.
Assistant Professor of Physical Education and Hygiene.	
ARTHUR K. HARRISON,	8 Allen Street.
Assistant Professor of Landscape Gardening.	
ERNEST ANDERSON, Ph.D.,	17 Phillips Street.
Assistant Professor of General and Physical Chemistry.	
HENRY E. SMITH, A.M.,	24 Pleasant Street.
Assistant Professor of English.	
WALTER W. CHENOWETH, A.B., M.Sc.,	North Amherst.
Assistant Professor of Pomology.	
ELMER M. McDONALD, B.Sc.,	24 Pleasant Street.
Assistant Professor of Agronomy.	
F. H. HESSELINK VAN SUCHTELEN, Ph.D.,	75 Pleasant Street.
Assistant Professor of Microbiology.	
HAROLD E. ROBBINS, B.Sc., A.M.,	12 Nutting Avenue.
Assistant Professor of Physics.	
GEORGE N. HOLCOMB, ² A.B., S.T.B.,	— —
Lecturer in History.	
FRANK W. RANE, M.F.,	Boston.
Lecturer in Forestry.	
CHARLES R. GREEN, B.Agr.,	Mount Pleasant.
Librarian.	
C. ROBERT DUNCAN, B.Sc.,	31 North Prospect Street.
Instructor in Mathematics.	
WILLARD A. WATTLES, A.M.,	24 Pleasant Street.
Instructor in English.	

¹ On leave of absence.² Resigned, to take effect Nov. 1, 1913.

WILLIAM L. HARMOUNT, A.B.,	86 Pleasant Street.
Instructor in French.	
ELVIN L. QUAIPE, B.Sc.Agr.,	13 Fearing Street.
Instructor in Animal Husbandry.	
WILLIAM L. MACHMER, A.M., M.E.,	3 Kendrick Place.
Instructor in Mathematics.	
ARTHUR N. JULIAN, A.B.,	Farview Way.
Instructor in German.	
WALTER E. PRINCE, Ph.B., A.M.,	13 Spring Street.
Instructor in English and Public Speaking.	
ADRIAN A. BROWN, B.Sc.,	24 Pleasant Street.
Instructor in Poultry Husbandry.	
SAMUEL COONS,	56 Pleasant Street.
Buttermaker.	
BERT C. GEORGIA, B.Sc.,	24 Pleasant Street.
Instructor in Market Gardening.	
FRANK N. BLANCHARD, A.B.,	9 Fearing Street.
Instructor in Zoölogy and Geology.	
MISS HELENA T. GOESSMANN, Ph.M.,	40 Amity Street.
Assistant in English.	
FREDERICK A. McLAUGHLIN, B.Sc.,	Clark Hall.
Assistant in Botany.	
RAYMOND G. SMITH, B.Sc.,	Clark Hall.
Assistant in Botany.	
ROBERT H. BOGUE, B.Sc.,	Meadow Street, North Amherst.
Assistant in Chemistry.	
WILLIAM J. FITZMAURICE,	- -
Assistant in Physical Education.	
HAROLD M. GORE, B.Sc.,	24 Pleasant Street.
Assistant in Physical Education.	
BURT A. HAZELTINE, B.Sc.,	4 North Prospect Street.
Assistant in Mathematics.	

GRADUATE ASSISTANTS.

CHARLES G. BAIRD, A.M.,	9 Fearing Street.
Department of Agricultural Economics.	
HENRY L. BROWN, B.Sc.,	120 Pleasant Street.
Department of Chemistry.	
ERNEST L. DAVIES, B.Sc.Agr.,	77 Pleasant Street.
Department of Microbiology.	
G. SCOTT FOWLER, B.Sc.,	24 Pleasant Street.
Department of Chemistry.	
WALTER H. HILLARY, B.Sc.,	Wilder Hall.
Department of Landscape Gardening.	
ARAO ITANO, B.Sc.,	75 Pleasant Street.
Department of Microbiology.	
RUSSELL F. LUND, A.B.,	Pine Heights.
Department of Agronomy.	
JAMES F. MARTIN, B.Sc.,	19 South East Street.
Department of Entomology.	
HAROLD A. ROBINSON, B.Sc.,	6 Allen Street.
Department of Chemistry.	
PAUL SEREX, Jr., B.Sc.,	Chemical Laboratory.
Department of Chemistry.	
CARL J. STRAND, A.M.,	77 Pleasant Street.
Department of Rural Sociology.	
CLARK L. THAYER, B.Sc.,	92 Pleasant Street.
Department of Floriculture.	

OTHER COLLEGE OFFICERS.

RALPH J. WATTS, B.Sc.,	10 Nutting Avenue.
Secretary to the President.	
HAROLD A. CRANE,	4 Nutting Avenue.
Cashier.	

NEWTON WALLACE,	Campus.
Electrician.	
PERCY C. SCHROYER,	6 Phillips Street.
Assistant Engineer.	
CLARENCE A. JEWETT,	112 Pleasant Street.
Superintendent of Buildings.	
JAMES WHITING,	16 Hallock Street.
Foreman, Department of Floriculture.	
JOHN J. LEE, Sergeant,	9 Phillips Street.
Assistant to the Military Detail.	
JOHN J. BARBER,	Campus.
Farm Superintendent.	
LAWRENCE S. DICKINSON, B.Sc.,	Campus.
Foreman of Grounds.	
JOHN L. BYARD,	21 Pleasant Street.
Superintendent of the Apiary.	
WILLIAM CHESLEY,	Draper Hall.
Steward of the Dining Hall.	
MISS BERTHA E. CHRISTIANSEN, A.B.,	9 Phillips Street.
Assistant to the Dean.	
MISS LORIAN P. JEFFERSON, A.M.,	84 Pleasant Street.
Expert Secretary, Division of Rural Social Science.	
MISS MARY E. CALDWELL,	Draper Hall.
Bookkeeper.	
MISS HENRIETTA L. WEBSTER,	Draper Hall.
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MISS DOROTHY MUDGE,	Draper Hall.
Stenographer, Treasurer's Office.	
MISS LILLIAN M. GELINAS,	79 Pleasant Street.
Stenographer, President's Office.	
— — — — —	— — — — —
Clerk, President's Office.	
MISS ALICE M. GILBERT,	Draper Hall.
Clerk, Department of Dairying.	
MISS LULIONA M. BARKER, A.M., B.Sc.,	9 Phillips Street.
Clerk, Department of Farm Administration.	
MISS LINA E. FISHER,	28 Pleasant Street.
Stenographer, Department of Chemistry.	
MISS GLADYS E. RUSSELL, A.B.,	Draper Hall.
Clerk, Division of Horticulture.	
MISS ADA M. CHANDLER, A.B.,	3 Fearing Street.
Cataloguing Clerk, Library.	
MISS MARION GUERTIN,	5 East Pleasant Street.
Stenographer, Department of Entomology.	
MISS OLIVE M. TURNER, B.Sc.,	22 Spaulding Street.
Clerk, Registrar's Office.	
MISS DOROTHY F. SMITH,	Draper Hall.
Clerk, Department of Floriculture.	
MISS LENA CHAPMAN,	6 Maple Avenue.
Library Assistant.	
MISS NELL C. MILTON,	Draper Hall.
Stenographer, Division of Rural Social Science.	
MISS CLARISSA G. BABCOCK, B.Sc.,	9 Phillips Street.
Clerk, Library.	
MISS ESTHER L. HOUGHTON, A.B.,	52 Pleasant Street.
Clerk, Department of Microbiology and Division of Agriculture.	
MISS REBECCA L. MELLOR, ¹	7 Northampton Road.
Clerk, Division of the Humanities.	

¹ Half time.

THE EXPERIMENT STATION STAFF.

WILLIAM P. BROOKS, Ph.D.,	5 Farview Way.
Director.	
JOSEPH B. LINDSEY, Ph.D.,	47 Lincoln Avenue.
Vice-Director.	
FRED C. KENNEY,	Mount Pleasant.
Treasurer.	
CHARLES R. GREEN, B.Agr.,	Mount Pleasant.
Librarian.	
Mrs. LUCIA G. CHURCH,	4 Hallock Street.
First Clerk, Office of the Director.	
Miss GRACE E. GALLOND,	28 Pleasant Street.
Stenographer, Office of the Director.	

DEPARTMENT OF PLANT AND ANIMAL CHEMISTRY.

JOSEPH B. LINDSEY, Ph.D.,	47 Lincoln Avenue.
Chemist.	
EDWARD B. HOLLAND, M.Sc.,	28 North Prospect Street.
Associate Chemist, in charge of Research Division.	
FRED W. MORSE, M.Sc.,	40 Pleasant Street.
Research Chemist.	
HENRI D. HASKINS, B.Sc.,	14 Amity Street.
In charge of Fertilizer Division.	
PHILIP H. SMITH, M.Sc.,	102 Main Street.
In charge of Feed and Dairy Division.	
LEWELL S. WALKER, B.Sc.,	19 Phillips Street.
Assistant.	
RUDOLPH W. RUPRECHT, B.Sc.,	32 North Prospect Street.
Assistant.	
CARLETON P. JONES, M.Sc.,	30 North Prospect Street.
Assistant.	
CARLOS L. BEALS, B.Sc.,	92 Pleasant Street.
Assistant.	
WALTER S. FROST, B.Sc.,	4 North Prospect Street.
Assistant.	
JAMES P. BUCKLEY, Jr.,	29 Lincoln Avenue.
Assistant.	
JAMES T. HOWARD,	North Amherst.
Collector.	
HARRY L. ALLEN,	89 Main Street.
Assistant.	
JAMES R. ALCOCK,	Hatch Barn.
Assistant.	
Miss F. ETHEL FELTON, A.B.,	9 Phillips Street.
First Clerk.	
Miss ALICE M. HOWARD,	North Amherst.
Clerk.	
Miss REBECCA L. MELLOR, ¹	7 Northampton Road.
Clerk.	

DEPARTMENT OF AGRICULTURE.

WILLIAM P. BROOKS, Ph.D.,	5 Farview Way.
Agriculturist.	
HENRY J. FRANKLIN, Ph.D.,	Wareham.
In charge of Cranberry Investigation.	
EDWIN F. GASKILL, B.Sc.,	Pleasant Street.
Assistant Agriculturist.	
HUBERT D. GOODALE, Ph.D.,	North Amherst.
Research Biologist in Poultry Husbandry.	

¹ Half time.

JOHN W. SAYER,	Campus.
Foreman, Poultry Experimental Yards.	
MISS FAY L. MILTON,	Draper Hall.
Clerk, Department of Poultry Husbandry.	

DEPARTMENT OF HORTICULTURE.

FRANK A. WAUGH, M.Sc.,	Campus.
Horticulturist.	
FRED C. SEARS, M.Sc.,	Mount Pleasant.
Pomologist.	
JACOB K. SHAW, Ph.D.,	1 Allen Street.
Research Pomologist.	
JOHN B. NORTON, B.Sc.,	84 Pleasant Street.
Graduate Assistant.	

DEPARTMENT OF BOTANY AND VEGETABLE PATHOLOGY.

GEORGE E. STONE, Ph.D.,	Mount Pleasant.
Botanist and Plant Pathologist.	
GEORGE H. CHAPMAN, ¹ M.Sc.,	- -
Assistant Botanist.	
EDWARD A. LARRABEE, B.Sc.,	Clark Hall.
Assistant Botanist.	
MISS JESSIE V. CROCKER,	Sunderland.
Clerk.	

DEPARTMENT OF ENTOMOLOGY.

HENRY T. FERNALD, Ph.D.,	44 Amity Street.
Entomologist.	
BURTON N. GATES, Ph.D.,	42 Lincoln Avenue.
Apiarist.	
ARTHUR I. BOURNE, A.B.,	12 East Pleasant Street.
Assistant in Entomology.	
MISS BRIDIE E. O'DONNELL,	Hadley.
Clerk.	

DEPARTMENT OF VETERINARY SCIENCE.

JAMES B. PAIGE, B.Sc., D.V.S.,	42 Lincoln Avenue.
Veterinarian.	

DEPARTMENT OF METEOROLOGY.

JOHN E. OSTRANDER, A.M., C.E.,	33 North Prospect Street.
Meteorologist.	

THE EXTENSION SERVICE STAFF.

WILLIAM D. HURD, M.Agr.,	82 Pleasant Street.
Director.	
EARNEST D. WAID, B.Sc.Agr.,	61 Amity Street.
Assistant Director.	
ORION A. MORTON,	Mount Pleasant.
Extension Professor of Agricultural Education.	
EZRA L. MORGAN, A.M.,	2 Allen Street.
Community Field Agent.	
MISS LAURA COMSTOCK,	84 Pleasant Street.
Extension Professor of Home Economics.	
GEORGE F. E. STORY, B.Sc.Agr.,	10 Allen Street.
Extension Instructor in Dairying and Animal Husbandry.	
RALPH W. REES, A.B., B.Sc.,	24 Pleasant Street.
Extension Instructor in Pomology.	
HERBERT J. BAKER, B.Sc.,	24 Pleasant Street.
Field Agent in Farm Management.	
PHILIP H. ELWOOD, B.Sc.Agr.,	Lincoln Avenue.
Extension Instructor in Civic Improvement.	

¹ On leave of absence; position filled temporarily by Mr. Orton L. Clark.

ERWIN H. FORBUSH,	8 Nutting Avenue.
Supervisor of Correspondence Courses.	
ALLISTER F. McDUGALL, B.Sc.,	- -
Demonstrator in charge of Automobile Truck.	
LAWRENCE B. BOSTON, ¹	Sandwich.
Agricultural Advisor, Barnstable County.	
JOHN A. SCHEUERLE, ¹	Springfield.
Secretary, Hampden County Improvement League.	
MISS MABEL R. CASE, A.B.,	Draper Hall.
First Clerk.	
MISS HANNAH M. GRIFFIN, A.B.,	Draper Hall.
Clerk.	
MISS CORA B. GROVER,	4 Hallock Street.
Stenographer.	
MISS MARION S. DONALDSON, B.Sc.,	Draper Hall.
Stenographer.	
MISS INA M. PAIGE,	Draper Hall.
Stenographer.	

¹ Gives part-time service to the Massachusetts Agricultural College.

STANDING COMMITTEES OF THE FACULTY.¹

1913-14.

CATALOGUE AND OTHER PUBLICATIONS.

Associate Professor EYERLY.
Associate Professor CANCE.
Assistant Professor SMITH.

COMMENCEMENT.

Professor PAIGE.
Professor WAUGH.
The Commandant.
Associate Professor PETERS.
Mr. KENNEY.
Mr. DUNCAN.

COURSE OF STUDY.

Professor HART.
Professor WAUGH.
Professor FOORD.
Professor SPRAGUE.
Professor FERNALD.
Professor OSTRANDER.
Professor CHAMBERLAIN.

DISCIPLINE (ADVISORY).

Professor MILLS.
Professor HASBROUCK.
Professor LEWIS.
Captain MARTIN.
Associate Professor GORDON.
Assistant Professor MACKIMMIE.

EMPLOYMENT.

Professor SEARS.
Mr. KENNEY.
Associate Professor HASKELL.

ENTRANCE EXAMINATIONS AND ADMISSION.

Professor HASBROUCK.
Professor GRAHAM.
Assistant Professor OSMUN.
Assistant Professor ASHLEY.
Mr. MACHMER.
Mr. WATTLES.

¹ The president of the college is ex officio member of each standing committee.

GRADUATE SCHOOL.

Professor MARSHALL.
Professor FERNALD.
Professor LINDSEY.
Professor PAIGE.
Professor STONE.
Professor SEARS.
Associate Professor GORDON.

LIBRARY.

Professor STONE.
Professor MARSHALL.
Professor WELLINGTON.
Associate Professor CANCE.

PHYSICAL EDUCATION AND ATHLETICS.¹

No appointments for 1913-14.

SCHEDULE.

Professor LOCKWOOD.
Professor SPRAGUE.
Associate Professor PETERS.

SCHOLARSHIP.

Associate Professor GORDON.
Professor MILLS.
Professor HASBROUCK.
Professor LEWIS.
Assistant Professor MACKIMMIE.

STUDENT LIFE.

Director HURD.
Professor CHAMBERLAIN.
Professor LEWIS.
Associate Professor McLEAN.
Associate Professor HASKELL.
Assistant Professor MACKIMMIE.
Assistant Professor HICKS.

UNCLASSIFIED STUDENTS.

Professor LOCKWOOD.
Professor SEARS.
Associate Professor PETERS.

APPOINTED TO ATHLETIC BOARD.

Professor PAIGE.
Professor HASBROUCK.
Assistant Professor OSMUN.

¹ In lieu of this a committee on health and sanitation is appointed for one year, consisting of Professor Marshall, Mr. Kenney, Professor Lockwood, the Commandant, Miss Comstock and Assistant Professor Hicks.

THE COLLEGE.

ADMISSION.

A. APPLICATION FOR ADMISSION.

All correspondence concerning admission should be addressed to the registrar.

Every applicant for admission to the college must be at least sixteen years old, and must present to the registrar proper testimonials of good character. Such testimonials, whenever possible, should come from the principal of the school at which the applicant has prepared for college. Candidates who desire to present themselves for examination in any subjects must make application to the college for such privilege on or before June 1 of the year in which examination is desired. Blanks for such application may be obtained by addressing the registrar of the college. All entrance credentials must be in the hands of the registrar before the applicant can matriculate.

B. MODES OF ADMISSION.

Students are admitted to the freshman class either upon certificate or upon examination. No *diploma* from a secondary school will be accepted.

CERTIFICATES. — Certificates will be received from those schools in New England which have been approved by the New England College Entrance Certificate Board. Principals of schools in New England who desire the certificate privilege should address the secretary of the Board, Professor Frank W. Nicolson, Wesleyan University, Middletown, Conn. Certificates from schools outside of New England will be received if those schools are on the approved list of the College Entrance Certificate Board of the section in which the school in question is located.

The credentials of the Board of Regents of the State of New York are accepted as satisfying the entrance requirements of this college when offered subject for subject.

Certificates must present not less than seven of the necessary fourteen credits in all. Those subjects lacking on certificate (except for the permitted number of conditions) must be made up at the time of the examinations for admission.

Blank forms for certification — sent to principals or school superintendents only — may be obtained on application to the registrar of the college.

EXAMINATIONS. — The examination in each subject may be oral or written, or both. The standard required for passing an examination for admission is 65 per cent. Conditions to the amount of two units will be allowed.¹

¹ *Entrance with Condition in English.* — Under the rule permitting entrance conditions of not more than two units of the preparatory subjects, applicants may be admitted and upon examination, with a condition in English, provided that they show, upon examination, satisfactory preparation in work entitling them to a ranking of 60 or higher.

Students so admitted, must, to remove the condition, pass an examination covering the regular three-units requirement.

Places of Examination. — Examinations for admission to the college are held as follows: —

In June of each year: in Amherst in the building of the Department of Physics, Massachusetts Agricultural College; in Boston, in the College of Liberal Arts of Boston University, Boylston Street, corner of Exeter; in Worcester, in Horticultural Hall.

In September, examinations will be held in Amherst only.

Schedule for Entrance Examinations, June 18-20, inclusive, 1914. — The examinations in June will follow this schedule: —

First Day.

- 7.45 A.M. Registration.¹
- 8.00 A.M. Plane geometry.
- 10.00 A.M. Chemistry.
- 11.30 A.M. Botany.
- 2.00 P.M. Algebra.
- 3.30 P.M. Physics.

Second Day.

- 8.00 A.M. Required English.
- 11.00 A.M. Solid geometry.
- 2.00 P.M. History, required and elective.

Third Day.

- 8.00 A.M. French, German, required and elective.
- 1.00 P.M. Latin A and B and all one-half electives point, except those already noted.

Schedule for Entrance Examinations in September. — In September, 1914, the examinations will be given September 2-5, inclusive, and will follow the order indicated below: —

First Day.

- 1.00 P.M. Registration.
- 1.15-5.00 P.M. Greek A and B.

Second Day.

- 8.00 A.M. Plane geometry.
- 10.00 A.M. Chemistry.
- 11.30 A.M. Botany.
- 2.00 P.M. Algebra.
- 3.30 P.M. Physics.
- 4.30 P.M. Elective English.

Third Day.

- 8.00 A.M. Required English.
- 11.00 A.M. Solid geometry, agriculture.
- 2.00 P.M. History, required and elective.

Fourth Day.

- 8.00 A.M. French, German, required and elective.
- 1.00 P.M. Latin A and B and all one-half credit electives, except those already noted.

C. REQUIREMENTS FOR ADMISSION.

The requirements for admission are based on the completion of a four-years' course in a high school, or its equivalent, and are stated in terms of units. The term unit means the equivalent of four or five recitations a week for a school year. **Neither more nor less credit will be given in any sub-**

¹ Candidates who have no examination at the time set for registration may register at the time of their first examination should they so desire.

ject than is indicated in the table below. Fourteen units must be offered for admission. In the list given below, *every subject in black-faced type is absolutely required and no substitution is allowed.* The subjects so typed total eight and one-half units. In addition to these points five and one-half more units must be chosen from the subjects printed in light-faced type.

Agriculture, ¹	½ or 1
Botany, ²	½ or 1
Chemistry, ²	1
Algebra,	1½
Plane geometry,	1
Solid geometry,	½
Trigonometry,	½
Physics, ²	1
Geology, ²	½
Physiography,	½
Physiology,	½
Zoölogy, ²	½
History³ (Ancient; Medieval and Modern; English; General; United States and Civics), any one,	1½
English,	3
English (elective), ¹	1
Modern Language (elementary French or elementary German),	2
Elementary French, ⁵	2
Elementary German, ⁵	2
Intermediate French,	1
Advanced French,	1
Intermediate German,	1
Advanced German,	1
Greek A, ¹	2
Greek B, ¹	2
Latin A,	2
Latin B,	2
Commercial geography, ⁶	½
Drawing, ⁶	½
Manual training, ⁶	½ or 1

PRESENTATION OF NOTE-BOOKS. — The keeping of a note-book is required as part of the preparation in those subjects indicated (see note 2, page 25).

Candidates presenting themselves for examination in such subjects must present at the same time the required note-book, properly certified by the principal. Candidates presenting such subjects on certificate should not present note-books; but their certificates must state that note-books have been satisfactorily completed.

D. STATEMENT OF PREPARATION REQUIRED FOR ADMISSION.

In some cases the requirements of the College Entrance Examination Board are here mentioned. A pamphlet containing detailed explanation of these requirements can be had of the Board for 10 cents. Address substation 84, New York City.

AGRICULTURE. — Owing to the wide divergence of the methods of teaching agriculture in the public schools, the student will be required to bring a statement from the principal of the amount and kinds of work accomplished and

¹ Examination in September only.

² Note-book required as part of preparation will be credited as part of the examination.

³ One must be offered for the required point, one, two or three others may be offered for elective points.

⁴ For each offered.

⁵ May be offered as elective if not offered to satisfy *required* points.

⁶ On certificate only, no examination given.

of the text-books used. The examination will be based somewhat upon this information; but it will call for not less than one-half year of creditable work of high school grade. **The examination in agriculture will be given in September only.**

BOTANY. — For one unit of credit in botany, the work outlined in the statement of requirements issued by the College Entrance Examination Board, or its equivalent, will be accepted. This work should occupy one school year and include laboratory and supplementary text-book study. For one-half unit of credit, work that covers the same ground but occupies half the time required for a full unit of credit will be accepted. These requirements are met by such texts as Steven's "Introduction to Botany" and Bergen and Davis's "Principles of Botany." A note-book containing neat, accurate drawings and descriptive records forms part of the requirement for either the half-unit or the one-unit credit, and this note-book must be presented by all applicants for admission upon examination in this subject. The careful preparation of an herbarium is recommended to all prospective students of this college, although the herbarium is not required.

CHEMISTRY. — The entrance examination in chemistry will cover the work outlined by the College Entrance Examination Board as preparatory for college entrance. In general, this consists of a year of high school chemistry from such text-books as Newell's "Descriptive Chemistry" or Remsen's "Elements of Chemistry," with laboratory work on the general properties of the common elements, some of the experiments being quantitative. The keeping of a note-book is required.

MATHEMATICS. — (*a*) *Required.* — Algebra: The four fundamental operations for rational algebraic expressions; factoring, determination of highest common factor and lowest common multiple by factoring; fractions, including complex fractions; ratio and proportion; linear equations, both numerical and literal, containing one or more unknown quantities; problems depending on linear equations; radicals, including the extraction of the square root of polynomials and numbers; exponents, including the fractional and negative; quadratic equations, both numerical and literal; simple cases of equations with one or more unknown quantities that can be solved by the methods of linear or quadratic equations; problems depending upon quadratic equations; the binomial theorem for positive integral exponents, the formulas for the *n*th term and the sum of the terms of arithmetic and geometric progressions, with applications.

Plane Geometry: The usual theorems and constructions of good text-books, including the general properties of plane rectilinear figures; the circle and the measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle; the solution of numerous original exercises, including loci problems; applications to the mensuration of lines and plane surfaces.

(*b*) *Elective.* — Solid Geometry: The usual theorems and constructions of good text-books, including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangle; the solution of numerous original exercises, including loci problems; applications to the mensuration of surfaces and solids.

Plane Trigonometry: A knowledge of the definitions and relations of trigonometric functions and of circular measurements and angles; proofs of the

principal formulas and the application of these formulas to the transformation of the trigonometric functions; solution of trigonometric equations, the theory and use of logarithms, and the solution of right and oblique triangles.

PHYSICS. — To satisfy the entrance requirement in physics, the equivalent of at least one unit of work is required. This work should consist of both class-room work and laboratory practice. The work covered in the class-room should be equal to that outlined in Hall & Bergen's "Text-book of Physics" or Millikan & Gale; the laboratory work should represent at least thirty-five experiments involving careful measurements, with accurate recording of each in laboratory note-book. This note-book, certified by the instructor in the subject, must be submitted by each candidate presenting himself for examination in physics; credit for passing the subject will be given on laboratory notes and on the examination paper submitted. Candidates entering on certificate will not be required to present note-books, but the principal's certification must cover laboratory as well as class-room work.

PHYSIOLOGY. — Hough & Sedgwick's "The Human Mechanism;" Martin's "The Human Body: Briefer Course."

ZOOLOGY, PHYSIOGRAPHY, GEOLOGY. — The following suggestions are made concerning preparation for admission in the subjects named above: —

For physiography, Davis's "Elementary Physical Geography;" Gilbert & Brigham's "Introduction to Physical Geography." For zoölogy, text-books entitled "Animals" or "Animal Studies," by Jordan, Kellogg and Heath; Linville & Kelley's "A Text-book in General Zoölogy." For geology, A. P. Brigham's "A Text-book of Geology" or Tarr's "Elementary Geology."

Applicants for examination in zoölogy are *required* to present certified laboratory note-books; applicants for examination in the other subjects are *advised* to present note-books, if laboratory work has been done. Good note-books may be given credit for entrance. Examination in these subjects will be general, in recognition of the different methods of conducting courses; but students will be examined on the basis of the most thorough secondary school courses.

HISTORY. — The required unit must be offered in either ancient history, medieval and modern history; English history, general history, or United States history and civics. Either one, two or three elective units in any of the historical subjects here named may be offered, provided that such units may not be offered in the same subject in which the required unit has been offered.

Preparation in history will be satisfactory if made in accordance with the recommendations of the committee of seven of the American Historical Association, as outlined by the College Entrance Examination Board. The examination will require comparisons and the use of judgment by the candidate rather than the mere use of memory, and it will presuppose the use of good text-books, collateral reading and practice in written work. Geographical knowledge may be tested by requiring the location of places and movements on outline maps.

To indicate in a general way the character of the text-book work expected, the texts of the following authors are suggested: Botsford, Morey or Myers, in ancient history (to 814 A.D.); Adams, West or Myers, in medieval history; Montgomery, Larned or Cheyney, in English history; Myers or Fisher, in general history; Fiske, together with MacLaughlin or Montgomery, in United States history and civics.

ENGLISH. — For 1914: —

English Grammar and Composition. — Command of correct and clear English (spoken or written) requires instruction in grammar and composition. English grammar should ordinarily be reviewed in the secondary school; and correct spelling and grammatical accuracy should be rigorously exacted in connection with all written work during the four years. The principles of English composition governing punctuation, the use of words, paragraphs, and the different kinds of whole composition, including letter writing, should be thoroughly mastered; and practice in composition, oral as well as written, should extend throughout the secondary school period. Written exercises may well comprise narration, description and easy exposition and argument based upon simple outlines. It is advisable that subjects for this work be taken from the student's personal experience, general knowledge and studies other than English, as well as from his reading in literature. Finally, special instruction in language and composition should be accompanied by concerted effort of teachers in all branches to cultivate in the student the habit of using good English in his recitations and various exercises, whether oral or written.

Literature. — Ability to read with accuracy, intelligence and appreciation is sought through study of books included in two lists, headed respectively "Reading" and "Study," from which may be framed a progressive course in literature covering four years. In connection with both lists the student should be trained in reading aloud, and encouraged to commit to memory some of the more notable passages, both in verse and in prose. As an aid to literary appreciation, he is further advised to acquaint himself with the most important facts in the lives of the authors whose works he reads, and with their place in literary history.

(a) Reading: The aim of this course is to foster in the student the habit of intelligent reading, and to develop a taste for good literature by giving him a first-hand knowledge of some of its best specimens. He should read the books carefully, but his attention should not be so fixed upon details that he fails to appreciate the main purpose and charm of what he reads.

With a view to large freedom of choice, the books provided for reading are arranged in the following groups, from which at least ten units (each unit being set off by semicolons) are to be selected, two from each group: —

I. The "Old Testament," comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings and Daniel, together with the books of Ruth and Esther; the "Odyssey," with the omission, if desired, of books I., II., III., IV., V., XV., XVI., XVII.; the "Iliad," with the omission, if desired, of books XI., XIII., XIV., XV., XVII., XXI.; Virgil's "Æneid." The "Odyssey," "Iliad" and "Æneid" should be read in English translations of recognized literary excellence.

For any unit of group I. a unit from any other group may be substituted.

II. Shakspeare's "Merchant of Venice;" "Midsummer Night's Dream;" "As You Like It;" "Twelfth Night;" "Henry the Fifth;" "Julius Cæsar."

III. Defoe's "Robinson Crusoe," Part I.; Goldsmith's "Vicar of Wakefield;" either Scott's "Ivanhoe" or "Quentin Durward;" Hawthorne's "House of the Seven Gables;" either Dickens's "David Copperfield" or "A Tale of Two Cities;" Thackeray's "Henry Esmond;" Mrs. Gaskell's "Cranford;" George Eliot's "Silas Marner;" Stevenson's "Treasure Island."

IV. Bunyan's "Pilgrim's Progress," Part I.; "The Sir Roger de Coverley Papers" in "The Spectator;" Franklin's "Autobiography" (condensed); Irving's "Sketch Book," Macaulay's "Essays on Lord Clive" and "Warren Hastings;" Thackeray's "English Humourists;" selections from Lincoln, including at least the two inaugurals, the speeches in Independence Hall and at Gettysburg, the last public address and the letter to Horace Greeley, along with a brief memoir or estimate; Parkman's "Oregon Trail;" either Thoreau's "Walden," or Huxley's "Autobiography" and selections from "Lay Sermons," including the addresses on "Improving Natural Knowledge," "A Liberal Education" and "A Piece of Chalk;" Stevenson's "Inland Voyage" and "Travels with a Donkey."

V. Palgrave's "Golden Treasury" (first series), books II. and III., with especial attention to Dryden, Collins, Gray, Cowper and Burns; Gray's "Elegy in a Country Churchyard" and Goldsmith's "Deserted Village;" Coleridge's "Ancient Mariner" and Lowell's "Vision of Sir Launfal;" Scott's "Lady of the Lake;" Byron's "Childe Harold," Canto IV., and "Prisoner of Chillon;" Palgrave's "Golden Treasury" (first series), book IV., with especial attention to Wordsworth, Keats and Shelley; Poe's "Raven," Longfellow's "Courtship of Miles Standish," and Whittier's "Snow Bound;" Macaulay's "Lays of Ancient Rome" and Arnold's "Sohrab and Rustum;" Tennyson's "Gareth and Lynette," "Lancelot and Elaine" and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "Hervé Riel," "Pheidippides," "My Last Duchess," "Up at a Villa — Down in the City."

(b) Study: This part of the requirement is intended as a natural and logical continuation of the student's earlier reading, with greater stress laid upon form and style, the exact meaning of words and phrases, and the understanding of allusions. For this close reading are provided a play, a group of poems, an oration and an essay, as follows: —

Shakspeare's "Macbeth;" Milton's "L'Allegro," "Il Penseroso" and "Comus;" either Burke's "Speech on Conciliation with America," or both Washington's "Farewell Address" and Webster's "First Bunker Hill Oration;" either Macaulay's "Life of Johnson," or Carlyle's "Essay on Burns."

Examination. — However accurate in subject-matter, no paper will be deemed satisfactory if seriously defective in punctuation, spelling or other essentials of good usage.

The examination will be divided into two parts, one of which may be taken as a preliminary, and the other as a final.

The first part of the examination will be based upon ten units chosen, in accordance with the plan described earlier, from the lists headed reading; and it may include also questions upon grammar and the simpler principles of rhetoric, and short compositions upon topics drawn from the student's general knowledge or experience. On the books prescribed for reading, the form of the examination will usually be the writing of short paragraphs on several topics which the candidate may choose out of a considerable number. These topics will involve such knowledge and appreciation of plot, character-development, and other qualities of style and treatment, as may be fairly expected of boys and girls. In grammar and rhetoric, the candidate may

be asked specific questions upon the practical essentials of these studies, such as the relation of the various parts of a sentence to one another, the construction of individual words in a sentence of reasonable difficulty, and those good usages of modern English which one should know in distinction from current errors.

The second part of the examination will include composition and those books comprised in the list headed study. The test in composition will consist of one essay or more, developing a theme through several paragraphs; the subjects will be drawn from the books prescribed for study, from the candidate's other studies and from his personal knowledge and experiences quite apart from reading. For this purpose the examiner will provide several subjects from which the candidate may make his own selections. The test on the books prescribed for study will consist of questions upon their content, form and structure, and upon the meaning of such words, phrases and allusions as may be necessary to an understanding of the works and an appreciation of their salient qualities of style. General questions may also be asked concerning the lives of the authors, their other works, and the periods of literary history to which they belong.

ENGLISH, ELECTIVE.¹—To secure a fourth entrance credit in English, the applicant should do (a) the full equivalent of three years' work (required English), and also (b) the full equivalent of a fourth year's work. Applicants not certified with a fourth entrance credit will be examined, provided that the applicant, on or before June 1, notify the Department of English of his intention to take the examination, and supply thereafter the information needed by the department to prepare the examination questions. The information blanks will be forwarded by the Department of English upon receipt of the notice.

Subjects accepted.—The applicant may offer (a) any one of the subjects stated hereunder, or (b) any two of these subjects in combination.

- (a) History of American literature.
- (b) History of English literature (or lives of the great authors).
- (c) Classics *other than those read to meet the three-credit requirement.*
- (d) Advanced composition.
- (e) History of the English language.
- (f) Advanced high school grammar.

Advanced Standing in College.—Whether advanced standing shall be given applicants entering with a fourth credit in English will be determined by consideration of each case individually. Much weight is given to the ability of the student to express himself correctly and clearly, to think clearly, and to grasp the meaning of printed language. A special examination will be given in the opening week of college, notice of which will be posted on the English bulletin board, for freshmen who wish to apply for advanced standing.

Presentation of Note-books and Themes.—Applicants for examination, either for fourth-unit credit or for advanced standing, are advised to present the note-books, themes, etc., prepared by them in the preparatory school, as an aid toward determining their proficiency.

ENGLISH. — For 1915-19 inclusive:—

The National Conference on Uniform Entrance Requirements in English voted that the following be the requirements for the years 1915, 1916, 1917, 1918 and 1919.

¹ Examination given in September only.

This supersedes the previously announced requirement for 1915.

The study of English in school has two main objects: (1) command of correct and clear English, spoken and written; (2) ability to read with accuracy, intelligence and appreciation.

Grammar and Composition.—The first object requires instruction in grammar and composition. English grammar should ordinarily be reviewed in the secondary school; and correct spelling and grammatical accuracy should be rigorously exacted in connection with all written work during the four years. The principles of English composition governing punctuation, the use of words, sentences and paragraphs should be thoroughly mastered; and practice in composition, oral as well as written, should extend throughout the secondary school period. Written exercises may well comprise letter-writing, narration, description and easy exposition and argument. It is advisable that subjects for this work be taken from the student's personal experience, general knowledge and studies other than English, as well as from his reading in literature. Finally, special instruction in language and composition should be accompanied by concerted effort of teachers in all branches to cultivate in the student the habit of using good English in his recitations and various exercises, whether oral or written.

Literature.—The second object is sought by means of two lists of books, headed, respectively, "Reading" and "Study," from which may be framed a progressive course in literature covering four years. In connection with both lists the student should be trained in reading aloud and encouraged to commit to memory some of the more notable passages both in verse and in prose. As an aid to literary appreciation, he is further advised to acquaint himself with the most important facts in the lives of the authors whose works he reads and with their place in literary history.

A. Reading.—The aim of this course is to foster in the student the habit of intelligent reading and to develop a taste for good literature by giving him a first-hand knowledge of some of its best specimens. He should read the books carefully, but his attention should not be so fixed upon details that he fails to appreciate the main purpose and charm of what he reads.

With a view to large freedom of choice, the books provided for reading are arranged in the following groups, from each of which at least two selections are to be made, except as otherwise provided under Group I.:—

Group I. Classics in Translation: The "Old Testament," comprising at least the chief narrative episodes in Genesis, Exodus, Joshua, Judges, Samuel, Kings and Daniel, together with the books of Ruth and Esther; the "Odyssey," with the omission, if desired, of books I., II., III., IV., V., XV., XVI., XVII.; the "Iliad," with the omission, if desired, of books XI., XIII., XIV., XV., XVII., XXI.; the "Æneid." The "Odyssey," "Iliad" and "Æneid" should be read in English translations of recognized literary excellence.

For any selection from group I. a selection from any other group may be substituted.

Group II. Shakspeare: "Midsummer Night's Dream;" "Merchant of Venice;" "As You Like It;" "Twelfth Night;" "The Tempest;" "Romeo and Juliet;" "King John;" "Richard II.;" "Richard III.;" "Henry V.;" "Coriolanus;" "Julius Cæsar;"¹ "Macbeth;"¹ "Hamlet."¹

Group III. Prose Fiction: Malory's "Morte d'Arthur" (about 100 pages); Bunyan's "Pilgrim's Progress," Part I.; Swift's "Gulliver's Travels" (voy-

¹ If not chosen for study under B.

ages to Lilliput and to Brobdingnag); Defoe's "Robinson Crusoe," Part I.; Goldsmith's "Vicar of Wakefield;" Frances Burney's "Evelina;" Scott's novels, any *one*; Jane Austen's novels, any *one*; Maria Edgeworth's "Castle Rackrent" or "The Absentee;" Dickens's novels, any *one*; Thackeray's novels, any *one*; George Eliot's novels, any *one*; Mrs. Gaskell's "Cranford;" Kingsley's "Westward Ho!" or "Hereward the Wake;" Reade's "The Cloister and the Hearth;" Blackmore's "Lorna Doone;" Hughes's "Tom Brown's School Days;" Stevenson's "Treasure Island" or "Kidnapped" or "Master of Ballantrae;" Cooper's novels, any *one*; Poe's "Selected Tales;" Hawthorne's "The House of the Seven Gables" or "Twice Told Tales" or "Mosses from an Old Manse;" a collection of short stories by various standard writers.

Group IV. Essays, Biography, etc.: Addison and Steele's "The Sir Roger de Coverley Papers" or selections from the "Tatler" and "Spectator" (about 200 pages); selections from Boswell's "Life of Johnson" (about 200 pages); Franklin's "Autobiography;" selections from Irving's "Sketch Book" (about 200 pages) or "Life of Goldsmith;" Southey's "Life of Nelson;" selections from Lamb's "Essays of Elia" (about 100 pages); selections from Lockhart's "Life of Scott" (about 200 pages); Thackeray's "Lectures on Swift, Addison and Steele in the English Humorists;" Macaulay: any one of the following essays: "Lord Clive," "Warren Hastings," "Milton," "Addison," "Goldsmith," "Frederic the Great," "Madame d'Arblay;" selections from Trevelyan's "Life of Macaulay" (about 200 pages); Ruskin's "Sesame and Lilies" or "Selections" (about 150 pages); Dana's "Two Years before the Mast;" Lincoln's "Selections," including at least the two inaugurals, the speeches in Independence Hall and at Gettysburg, the last public address, the letter to Horace Greeley, together with a brief memoir or estimate of Lincoln; Parkman's "The Oregon Trail;" Thoreau's "Walden;" Lowell's "Selected Essays" (about 150 pages); Holmes's "The Autocrat of the Breakfast Table;" Stevenson's "An Inland Voyage" and "Travels with a Donkey;" Huxley's "Autobiography" and selections from "Lay Sermons," including the addresses on "Improving Natural Knowledge," "A Liberal Education" and "A Piece of Chalk;" a collection of "Essays" by Bacon, Lamb, De Quincey, Hazlitt, Emerson and later writers; a collection of "Letters" by various standard writers.

Group V. Poetry: Palgrave's "Golden Treasury" (first series), books II. and III., with special attention to Dryden, Collins, Gray, Cowper and Burns; Palgrave's "Golden Treasury" (first series), book IV., with special attention to Wordsworth, Keats and Shelley (if not chosen for study under B); Goldsmith's "The Traveller" and "The Deserted Village;" Pope's "The Rape of the Lock;" a collection of English and Scottish ballads, as, for example, some "Robin Hood" ballads, "The Battle of Otterburn," "King Estmere," "Young Beichan," "Bewick and Grahame," "Sir Patrick Spens" and a selection from later ballads; Coleridge's "The Ancient Mariner," "Christabel" and "Kubla Khan;" Byron's "Childe Harold," Canto III. or IV., and "The Prisoner of Chillon;" Scott's "The Lady of the Lake," or "Marmion;" Macaulay's "The Lays of Ancient Rome," "The Battle of Naseby," "The Armada," "Ivry;" Tennyson's "The Princess" or "Gareth and Lynette," "Lancelot and Elaine" and "The Passing of Arthur;" Browning's "Cavalier Tunes," "The Lost Leader," "How They Brought the Good News from Ghent to Aix," "Home Thoughts from Abroad," "Home Thoughts from the Sea," "Incident of the French Camp," "Hervé Riel," "Pheidippides," "My Last

Duchess," "Up at a Villa — Down in the City," "The Italian in England," "The Patriot," "The Pied Piper," "De Gustibus," "Instans Tyrannus;" Arnold's "Sohrab and Rustum" and "The Forsaken Merman;" selections from American poetry, with special attention to Poe, Lowell, Longfellow and Whittier.

B. Study. — This part of the requirement is intended as a natural and logical continuation of the student's earlier reading, with greater stress laid upon form and style, the exact meaning of words and phrases, and the understanding of allusions. The books provided for study are arranged in four groups, from each of which one selection is to be made.

Group I. Drama: Shakspeare's "Julius Caesar," "Macbeth," "Hamlet."

Group II. Poetry: Milton's "L'Allegro," "Il Penseroso" and either "Comus" or "Lycidas;" Tennyson's "The Coming of Arthur," "The Holy Grail" and "The Passing of Arthur;" the selections from Wordsworth, Keats and Shelley in Book IV. of Palgrave's "Golden Treasury" (first series).

Group III. Oratory: Burke's "Speech on Conciliation with America;" Macaulay's "Speech on Copyright" and Lincoln's "Speech at Cooper Union;" Washington's "Farewell Address" and Webster's "First Bunker Hill Oration."

Group IV. Essays: Carlyle's "Essay on Burns," with a selection from Burns's "Poems;" Macaulay's "Life of Johnson;" Emerson's "Essay on Manners."

Examination. — However accurate in subject-matter, no paper will be considered satisfactory if seriously defective in punctuation, spelling or other essentials of good usage.

The examination will be divided into two parts, one of which will be on grammar and composition, and the other on literature.

In grammar and composition, the candidate may be asked specific questions upon the practical essentials of these studies, such as the relation of the various parts of a sentence to one another, the construction of individual words in a sentence of reasonable difficulty, and those good usages of modern English which one should know in distinction from current errors. The main test in composition will consist of one or more essays, developing a theme through several paragraphs; the subjects will be drawn from the books read, from the candidate's other studies and from his personal knowledge and experience quite apart from reading. For this purpose the examiner will provide several subjects, perhaps eight or ten, from which the candidate may make his own selections. He will not be expected to write more than four hundred words per hour.

The examination in literature will include: —

(a) General questions designed to test such a knowledge and appreciation of literature as may be gained by fulfilling the requirements defined under "A, Reading," above. The candidate will be required to submit a list of the books read in preparation for the examination, certified by the principal of the school in which he was prepared; but this list will not be made the basis of detailed questions.

(b) A test on the books prescribed for study, which will consist of questions upon their content, form and structure, and upon the meaning of such words, phrases and allusions as may be necessary to an understanding of the works and an appreciation of their salient qualities of style. General questions may also be asked concerning the lives of the authors, their works and the periods of literary history to which they belong.

The Massachusetts Agricultural College calls attention to the following recommendations of the national conference, which agree with its policy:—

1. That colleges so desiring may set an examination requiring no prescribed books, but testing the same general kind of preparation as that indicated in the foregoing requirements.

2. That individual colleges take such steps as may be found necessary to ascertain whether candidates for entrance possess an adequate equipment in oral English.

As rapidly as seems expedient the college will proceed in accordance with these recommendations. Schools wishing to present candidates prepared in conformity to the intent of the recommendations will have the co-operation of the college.

FRENCH. — The necessary preparation for this examination is stated in the description of the two-year course in elementary French recommended by the Modern Language Association, contained in the definition of requirements of the College Entrance Examination Board.

Third and fourth year French (elective subjects for admission). — For a third credit unit in French as an elective subject for entrance, the work heretofore described by the College Entrance Examination Board as "intermediate" is expected. For a fourth credit unit, the work described as "advanced" is expected.

GERMAN. — The entrance requirements in German conform to those of the College Entrance Examination Board for elementary German (the standard two-year requirements).

Third and fourth year German (elective subjects for admission). — For a third credit unit in German as an elective subject for entrance, when required units have been offered in German, the work heretofore described by the College Entrance Examination Board as "intermediate" is expected. For a fourth credit unit, the work described as "advanced" is expected.

GREEK. — Greek will receive credit as an elective requirement upon either examination or certification, as follows (**examination in September only**):—

A. Two credit units will be allowed if satisfactory proficiency is shown (including grammar) in (a) the translation of a passage or passages taken from the first four books of Xenophon's "Anabasis," and (b) the translation of passages of Attic prose at sight.

B. Three credit units will be allowed if, in addition to the above, satisfactory proficiency be shown in (a) the translation of a passage or passages from the first six books of Homer's "Iliad," and (b) translation of passages of Homer's "Iliad" at sight, with questions on the form and constructions of the passages.

LATIN. — Latin will receive credit as an elective requirement upon either examination or certification, as follows:—

A. Two credit units will be allowed if satisfactory proficiency is shown (including grammar) in (a) the translation of a passage or passages taken from Cæsar's "Gallic War," covering at least four books, and (b) the translation of passages of Latin prose at sight.

B. Three credit units will be allowed if, in addition to the above, satisfactory proficiency be shown in (a) the translation of a passage or passages selected from either books I. to VI. of Virgil's "Æneid," or six orations of Cicero, including those against Catiline; and (b) the translation into Latin prose of a passage of connected English narrative based on some portion of Cæsar's "Gallic War," books I. to IV.

COMMERCIAL GEOGRAPHY.¹ — Preparation should be made in a course equivalent to that laid down in Adams's "Commercial Geography," Trotter's "Geography of Commerce," or a similar work.

DRAWING.¹ — Applicants may offer either freehand or mechanical drawing, or both. They must be able to make an accurate freehand sketch, in either outline or light and shade, of the appearance of a group of geometric solids, and have a sufficient knowledge of perspective to enable them to draw correctly a simple geometric model from memory; or, if they present mechanical drawing, they must have considerable working familiarity with drawing instruments, and be able to make an accurate inked working drawing, in orthographic projection, of some simple object. Emphasis is laid on facility in doing good freehand lettering. For a limitation of the work that may be presented see "Manual Training."

MANUAL TRAINING.¹ — An entrance credit of one-half or one unit is allowed for manual training, on the presentation of a certificate from the principal of the school showing the scope and character of the applicant's work. The preparation may include mechanical drawing, working in wood, metals, leather, etc. When mechanical drawing is presented as a part of the work in manual training, no other credit for drawing will be allowed. No examination is given in this subject; applicants must present certificates to secure credit.

E. ADMISSION TO ADVANCED STANDING.

Candidates for admission to advanced standing, in addition to meeting the regular entrance requirements, must also pass examinations in those subjects already pursued by the class they desire to enter. To meet this requirement, a student transferring to this college from another college or university of recognized standing must present the following credentials:—

1. A letter of honorable dismissal from the institution with which he has been connected.
2. A statement or certificate of his entrance record.
3. A statement from the proper officer showing a complete record of his work while in attendance.
4. A marked catalogue showing the courses pursued.

These credentials should be presented to the registrar. Applications will be judged wholly on their merits and the college may prescribe additional tests before accepting applicants or determining the standing to be granted them.

F. OTHER INFORMATION ABOUT ENTRANCE.

1. The privileges of the college may be withdrawn from any student at any time if such action is deemed advisable. (It is immaterial whether the pupil has entered by certificate or by examination.)

2. The examination in each subject may be either oral or written, or both. The standard required for passing an entrance examination is 65 per cent.

3. Candidates must receive credit for twelve units out of the total number required for entrance, and will be conditioned in those subjects not passed. No candidate deficient in both algebra and plane geometry will be admitted.

4. Examinations for the removal of entrance conditions will be held as follows: (1) First entrance condition examination, in the week following

¹ On certificate only.

the Thanksgiving recess. (2) Second entrance condition examination, in the sixteenth week of the first semester.

5. Credits for entrance requirements, whether gained by certificate or by examination, will hold good for one year.

6. Examinations in part of the subjects required for entrance may be taken one year before entering college.

7. For information concerning expenses, scholarships, etc., see "General Information."

8. For information concerning admission to short courses see "Short Courses."

G. UNCLASSIFIED STUDENTS.

All requests for information concerning admission of unclassified students should be addressed to Professor W. P. B. Lockwood, chairman of committee on unclassified students.

Students not candidates for a degree (unclassified students) are admitted under the following provisions: —

1. No entrance examination is required, but applicants must bring certificates showing that they have finished a four-years' high school course or its equivalent, and furnish satisfactory testimonials as to moral character.

2. No applicant under twenty-one years of age will be admitted as an unclassified student.

3. Each unclassified student must take from the regular courses a minimum of twelve credit hours a week.

4. In order to be admitted to any course, an unclassified student must have had all prerequisite subjects for that course.

5. Every unclassified student must do all the work of the courses elected, and take all examinations therein. In order to pass such courses he must attain a grade of at least 75 per cent. An unclassified student who passes in less than two-thirds of his work will be dropped from college.

6. All unclassified students are subject to the supervision of a special committee.

7. Any unclassified student may be dropped from college at any time if his presence in any class is undesirable or his work is unsatisfactory; and no unclassified student will be allowed to remain in college more than four semesters without the special permission of the faculty.

8. Unclassified students are subject to the regulations applying to classified students.

9. No student of this or any other institution who has not done efficient work therein shall be permitted to register as an unclassified student.

10. No unclassified student shall be allowed to participate in any inter-collegiate contests.

COURSES OF INSTRUCTION.

A. TABLE OF FRESHMAN AND SOPHOMORE SUBJECTS.

The figures indicate the number of credit hours a week. For details, see the descriptions of courses.

FRESHMAN YEAR.

First Semester.

Subjects.	All work required.	Hours per Week.
Chemistry,		3
Algebra,		3
Solid Geometry, ¹		2
English,		4
Public Speaking (at option of instructor),		1
French or German, ²		4
Drill,		1
Hygiene,		1
College Life (attendance without credit).		

18 or 19

Second Semester.

Subjects.	All work required.	Hours per Week.
Animal Husbandry,		2
Chemistry,		3
Trigonometry,		3
Algebra,		2
English,		4
Public Speaking (if not taken in semester one),		1
French or German,		4
Drill,		1
Physical Education,		1

20 or 21

SOPHOMORE YEAR.

First Semester.

Subjects.	All work required.	Hours per Week.
Agronomy,		3
Physics,		5
Zoology,		3
English,		2
French or German,		3
Tactics,		1
Drill,		1
Chemistry or Animal Husbandry (elective),		3

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¹ To be taken in course when not offered for entrance.

² Students who have had three or four years of one language in the preparatory school will elect the other language. Students who have had two years of one language may have their choice of election. Whichever language they so elect must be continued to the end of the first semester of the sophomore year. Eleven college credits are required in this language.

Second Semester.

All courses under "Required," with any two of those under "Elective."

Subjects.	Required.	Hours per Week.
Elementary Horticulture,		2
Botany,		4
English,		2
Agricultural Industry,		3
Drill,		1
Tactics,		1
Physical Education,		1
		<hr/> 14

Elective.

French or German,	} Each 3 hours. Any two,	6
Geology,		
Physics,		
Chemistry,		
Surveying,		
		<hr/> 20

B. MAJORS: JUNIOR AND SENIOR YEARS.

GENERAL STATEMENT.

A major consists of 30 hours of correlated work, to be arranged by the student and an instructor called the adviser.

The list of courses found under each major on subsequent pages should not be considered as necessarily a rigid program to be followed. The heads of departments have suggested this series of courses as the best for the average man majoring in their departments. Advisers may, however, make modifications to suit the particular needs of the student, provided these modifications conform precisely to the class schedule as published for the year.

RULES.

RULE 1. *Election.* — Each student, in the second semester of his sophomore year, shall elect a major subject from the list of majors given below; and this major shall consist of 30 credit hours of correlated work.

RULE 2. *Minimum Credits.* — The minimum number of credits for the junior and senior years shall be 65, inclusive of Military Drill and Physical Education.

RULE 3. *Maximum Credits.* — The maximum number of credits for any semester of the junior or senior year shall be 21.

RULE 4. *Humanities and Rural Social Science.* — A minimum of 15 credit hours in the Divisions of the Humanities and Rural Social Science will be required of all students during their junior and senior years, with the following restriction: that a minimum of 3 credit hours will be required in each of the Divisions.

RULE 5. *Advisers.* — The work of each junior and senior will be under the immediate supervision of an instructor designated as major adviser. Ordinarily, the major adviser will be the head of the department in which the student intends to elect his major. Each student should consult with the adviser as soon as possible. The adviser has full authority to prescribe the student's work up to 30 hours. It is understood, however, that so far as practicable the individual needs of the student will be recognized. It is also hoped and expected that students will be disposed to seek the counsel of the adviser with respect to the remaining courses required for graduation.

RULE 6. *Free Electives.* — Each student is required to take 30 hours in his major and also 15 hours in the Divisions of the Humanities and Rural Social Science, making a total of 45 hours. He is allowed free choice of courses to complete his required hours, this remainder amounting to 15 hours minimum, or 35 hours maximum for the two years.

RULE 7. *Registration.* — No upper classman shall register until his major course of study is approved by his adviser.

(1) Course cards for recording the election of majors will be issued from the registrar's office on June 1.

(2) This card must be submitted by each student to his major adviser, who will lay out the course for the year and countersign the card.

(3) Each course card must be filled out, giving the name of student, his college address, the name of parent or guardian, and the student's home address. When the major courses have been entered on this card, and the hours of free elections added by the student, the card must be returned to the registrar not later than June 10.

RULE 8. *Changes.* — Applications for changes may be made to the dean in writing at any time; when approved by him and by the committee on scholarship, they become operative at the beginning of the semester following, provided that no change in the selection of a major may be made by any student after registration day of his senior year.

LIST OF MAJORS.

Agriculture.

Professor JAMES A. FOORD, Adviser.

Course.	Credit.
Agronomy 3,	3
Agronomy 6,	3
Animal Husbandry 3,	3
Animal Husbandry 5,	3
Animal Husbandry 9,	3
Dairying 1,	3
Dairying 2,	3
Farm Administration 3,	3
Farm Administration 4,	3
Microbiology 1 and 2,	5
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Chemistry 7 and 8, Veterinary Science 1, Microbiology 2, Pomology 1 and Animal Husbandry 6 are suggested as additional courses for the student fitting himself for general agriculture.

Agronomy.

Associate Professor SIDNEY B. HASKELL, Adviser.

Course.	Credit.
Agronomy 3,	3
Agronomy 4,	3
Agronomy 5,	3
Agronomy 6,	3
Agronomy 8,	3
Animal Husbandry 9,	3
Farm Administration 4,	3
Chemistry 5,	5
Chemistry 6,	5
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Animal Husbandry.

Associate Professor J. ALLAN McLEAN, Adviser.

Course.	Credit.
Agronomy 3,	3
Veterinary Science 1, Veterinary Hygiene and Stable Sanitation,	3
Veterinary Science 2, General Veterinary Pathology (Materia Medica and Therapeutics),	3
Animal Husbandry 5,	3
Animal Husbandry 6,	1
Animal Husbandry 8,	2
Animal Husbandry 9,	3
Animal Husbandry 10,	3
Animal Husbandry 11,	2
Dairying 1,	3
Farm Administration 3,	3
Farm Administration 4,	3
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Dairying.

Professor WILLIAM P. B. LOCKWOOD, Adviser.

Course.	Credit.
Animal Husbandry 5,	3
Animal Husbandry 6,	1
Animal Husbandry 8,	2
Animal Husbandry 9,	3
Animal Husbandry 11,	2
Dairying 1,	3
Dairying 2,	2
Dairying 3,	3
Microbiology 11 and 12,	3
Farm Administration 3,	3
Farm Administration 4,	3
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Poultry Husbandry.

Professor JOHN C. GRAHAM, Adviser.

Course.	Credit.
Poultry Husbandry 1,	2
Poultry Husbandry 2,	2
Poultry Husbandry 3,	1
Poultry Husbandry 4,	1-3
Poultry Husbandry 5,	1
Poultry Husbandry 6,	3
Poultry Husbandry 7,	3
Poultry Husbandry 9,	3
Pomology 1,	3
Agronomy 3,	3
Animal Husbandry 5,	3
Animal Husbandry 9,	3
Veterinary Science 7,	3
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	31-33

Floriculture.

Professor ———, Adviser.

Course.	Credit.
Floriculture 1,	4
Floriculture 2,	4
Floriculture 3,	3
Floriculture 4,	3
Horticulture 3,	3
Horticulture 4,	3
Entomology 1,	3
Market Gardening 2,	3
Botany 2,	4
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Note.—Horticulture 3 and 4 is a junior subject, but to balance the work for the two years it would be better for the floricultural students to take the course in the senior year.

Forestry.

Professor WILLIAM D. CLARK, Adviser.

Course.	Credit.
Forestry 3,	3
Forestry 4,	3
Forestry 5,	5
Forestry 6,	3
Entomology 5,	3
Landscape Gardening 1,	3
Horticulture 3,	3
Horticulture 4,	3
Botany 13,	4
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Students who propose to major in forestry should elect geology and surveying in sophomore year.

Landscape Gardening.

Professor FRANK A. WAUGH, Adviser.

Course.	Credit.
Landscape Gardening 1,	3
Landscape Gardening 2,	3
Landscape Gardening 3,	3
Landscape Gardening 4,	3
Landscape Gardening 5,	2
Landscape Gardening 6 or 10,	2
Landscape Gardening 7,	3
Landscape Gardening 8,	3
Drawing 1,	3
Drawing 2,	3
Horticulture 3,	3
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Courses for juniors *only*: Landscape Gardening 1 and 2, Drawing 1 and 2.

Courses for seniors and graduates *only*: Landscape Gardening 3, 4, 7 and 8.

Courses open to juniors and seniors, both if possible: Horticulture 3 and 4.

This grouping of subjects is offered only as an example. Other groupings may be approved by the adviser, but such other groupings must be subject to the class schedule.

Pomology.

Professor FRED C. SEARS, Adviser.

Course.	Credit.
Pomology 1,	3
Pomology 2,	3
Pomology 3,	3
Pomology 4,	3
Pomology 6,	2
Botany 5,	2
Agronomy 5,	3
Entomology 1,	3
Entomology 2,	3
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Agricultural Chemistry.

Associate Professor CHARLES A. PETERS, Adviser.

Course.	Credit.
Chemistry 5,	5
Chemistry 6,	5
Chemistry 9,	5
Chemistry 10,	5
Chemistry 11,	5
Chemistry 12, 14 or 16,	5
Chemistry 13,	3
Chemistry 15,	3
Chemistry 18,	2

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The major will consist of 30 credit hours selected from this list. The student will be advised concerning other subjects suitable to be taken in connection with Chemistry.

Economic Entomology.

Professor HENRY T. FERNALD, Adviser.

Course.	Credit.
Entomology 1,	3
Entomology 2,	2
Entomology 3,	4
Entomology 4,	4
Entomology 5,	3
Entomology 8,	3
Botany 3,	4
Botany 4,	2
Zoölogy 3,	3
Zoölogy 4,	3

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A major in Economic Entomology does not necessarily include all the subjects given in this list, but may be varied to some extent, in accordance with the future plans of the student, other modifications being permissible.

Rural Social Science.

Dr. ALEXANDER E. CANCE, Associate Professor E. K. EYERLY, Advisers.

Course.	Credit.
Economics and Sociology 1,	3
Agricultural Economics 3,	3
Agricultural Economics 7,	3
Agricultural Economics 6 or 8,	3
Rural Sociology 2,	3
Rural Sociology 4,	1
Rural Sociology 5 or 7,	3
Rural Sociology 8,	3
Rural Sociology 10,	3
Rural Sociology 11,	3
Farm Administration 4,	3

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Microbiology.

Dr. CHAS. E. MARSHALL, Adviser.

Course.	Credit.
Microbiology 1 and 2,	5
Microbiology 3 and 4,	5
Microbiology 5 and 6,	3
Microbiology 7 and 8,	3
Chemistry 3,	5
Chemistry 4,	5
Chemistry 5,	3
Chemistry 6,	3
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Courses 9 in Chemistry; 3, 4, 5 in Botany; 3, 4, 5, 6 in Zoölogy; 1, 3, 5, 6 in Veterinary Science, together with German and French, are suggested as collateral lines. Dairying 1 and Agronomy 5 are essential to a grasp of the larger problems involved in Microbiology as applied to Agriculture.

Plant Physiology and Pathology.

Professor GEORGE E. STONE, Adviser.

Course.	Credit.
Botany 3,	4
Botany 4,	2
Botany 10,	4 or 5
Botany 14,	4
Botany 11,	5
Chemistry 5,	5
Chemistry 6,	5
Entomology 1,	3
Entomology 2,	2
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Agricultural Education.

Professor WILLIAM R. HART, Adviser.

Course.	Credit.
Agricultural Education 1,	3
Agricultural Education 2,	3
Agricultural Education 3,	3
Agricultural Education 4,	3
Agronomy 3,	3
Dairying 5,	2
Farm Administration 3,	3
Poultry Husbandry 1,	2
Market Gardening 2, }	3
Agronomy 5,	
Botany 5,	2
Pomology 1,	3
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Some substitutions of other technical courses for some of the technical courses above mentioned will be made to meet the needs of individual students.

SUMMARY.

There are four preliminary steps which a student should take in arranging for his major work.

1. Select a major.
2. Confer with major adviser for arrangement of courses, the plan to be approved by adviser in accordance with Rule 5 previously stated.
3. Select courses covering the four semesters of the junior and senior years in such a way that a minimum of 15 credits will be taken in the two Divisions, the Humanities and Rural Social Science; the distribution of all but 3 of these credits may be decided by the student.
4. Choose other courses so that the total number of credits for any semester shall be not less than 16 nor more than 21. (See Rules 2 and 3.)

C. UNDERGRADUATE COURSES.

All courses given in the *first semester bear odd numbers*; all given in the *second semester bear even numbers*. Studies are pursued in courses, "course" implying the study given a subject within one semester, without regard to the total number of hours or to the number of credits. The special mention of certain courses as prerequisite to other courses does not imply that no courses but those so mentioned are "preliminary or preparatory" within the meaning of the Book of Rules.

DIVISION OF AGRICULTURE.

Professor FOORD.

AGRONOMY.

Associate Professor HASKELL, Dr. BROOKS, Assistant Professor McDONALD, Mr. LUND.

Required Course.

1. SOILS AND FERTILIZERS. — A study of the formation, classification and physical and chemical properties of soils. This is followed by study of methods of soil improvement and of maintenance of fertility, including the use of farm manures, commercial fertilizers and soil amendments. Prerequisites, Chemistry 1 and 2. Sophomores; 3 hours. Credit, 3.

Associate Professor HASKELL and Assistant Professor McDONALD.

Elective Courses.

3. FIELD AND FORAGE CROPS. — History, classification, cultivation, harvesting, commercial grading and valuation. The crops studied are the cereal grains, grasses, legumes, forage and root crops suitable to New England conditions. The work includes lecture, laboratory and field study of these various crops. Prerequisites, Agronomy 1 and Botany 2. For juniors primarily; 1 lecture and 2 laboratory periods. Credit, 3.

Assistant Professor McDONALD.

4. ADVANCED FIELD CROPS. — Commercial production of grain, hay and root crops. Lecture, laboratory, and field study of the purity, quality, and vitality of the seed of these crops and the handling, grading and judging of their products. The work offered will not be confined to New England conditions. Prerequisite, Agronomy 3. For juniors primarily; 2 lectures and 1 laboratory period. Credit 3.

Assistant Professor McDONALD.

5. ADVANCED SOILS. — A field, laboratory and lecture course on soils, their nature, composition, physical qualities, improvement. Field work, as far as the season allows, consists of detailed soil surveys in different parts of the Connecticut valley; this followed by laboratory work on the physical properties of the soil collected, on the effect of fertilizers on the soil, and on the mixing of fertilizers. Prerequisite, Agronomy 1. For seniors primarily; 1 lecture period and 1 4-hour laboratory period weekly. Credit, 3.

Associate Professor HASKELL.

6. DRAINAGE AND IRRIGATION. — A field and lecture course on soil improvement, by drainage and irrigation. As a thesis each man is required, after studying an area of wet or swampy land, to present plans and estimates for its reclamation. Prerequisites, Agronomy 1 and Mathematics 6. Juniors and seniors; 1 lecture period and 1 4-hour laboratory period weekly. Credit 3.
Associate Professor HASKELL.

8. MANURES AND FERTILIZERS. — An advanced course, giving a general discussion of the different theories which have been held relative to the functions and importance of manures and fertilizers, and leading up to the views at present accepted. Each of the important manures and fertilizers will be discussed, its origin and its chemical and physical characteristics being considered. Each material taken up will be studied in relation to its capacity to supply plant food and to its effects upon soil texture, moisture, temperature and flora. Considerable attention will be devoted to consideration of the experimental work which has been done, and which is now in progress, in manures and fertilizers. This course is intended for seniors only. Prerequisite, Agronomy 1; 3 lectures a week, with occasional seminars. Credit, 3.
Dr. BROOKS.

ANIMAL HUSBANDRY.

Associate Professor McLEAN, Mr. QUAIFFE.

Required Course.

2. MARKET CLASSES AND GRADES OF LIVE STOCK. — A study of the different market classes and grades of horses, cattle, sheep and swine. The purpose of this course is to familiarize beginners with the different classes of stock, and to give them a grounding in live stock judging. Text-book, Craig's "Live Stock Judging." Freshmen; 2 laboratory periods. Credit, 2.
Associate Professor McLEAN and Mr. QUAIFFE.

Elective Courses.

3. BREEDS AND TYPES OF LIVE STOCK. — A course covering the origin, history, development and characteristics of the different breeds of horses, cattle, sheep and swine. Text-book, Plumb's "Breeds and Types of Farm Animals." Prerequisite, Animal Husbandry 2. Sophomores; 1 lecture and 2 laboratory periods. Credit, 3.

Associate Professor McLEAN and Mr. QUAIFFE.

5. PRINCIPLES OF BREEDING. — This course is designed to familiarize the student with the problems involved in animal and plant improvement; to acquaint him with the facts which are already established; to scrutinize prevailing theories; and to indicate the lines and methods of further work. Some of the subjects studied are: variations, their causes and heritability; De Vrie's theory of mutations; the inheritance of acquired characters; the pure line; Mendelian law; the making of new types; the determination of sex; applications to human heredity. A few periods at the end of the course are devoted especially to the application of principles in live stock improvement. Text, "Genetics," by Herbert E. Walter. Supplementary reading. Prerequisite, Zoölogy 1; 3 lectures. Credit, 3.
Associate Professor McLEAN.

6. **LIVE-STOCK MANAGEMENT.** — The work of this course consists of laboratory work by the individual students in the handling of live stock; with horses, such work as halter breaking, breaking to drive, driving, harnessing, casting and fitting for show will be done; similarly, the practical handling of cattle, sheep and swine will be fully treated. Special study is given to halter making, splicing, hitches, knots and all rope work. Prerequisite, Animal Husbandry 3. Juniors; 1 laboratory period. Credit, 1. Mr. QUALFE.

8. **ADVANCED STOCK JUDGING.** — This course is designed to equip Animal Husbandry students in the judging of classes of different types of live stock; to strengthen them in the selection of superior sires; and equip them for stock judging at fairs. Visits will be made to the best herds for the various breeds of stock in the State. Judging teams to represent the college will be selected largely from this class. Prerequisite, Animal Husbandry 3. Juniors; 2 laboratory periods. Credit, 2. Associate Professor McLEAN.

9. **FEEDING AND MANAGEMENT.** — A study of the principles of animal nutrition; of the composition and qualities of feeding materials; of the feeding, care and management of dairy cattle from birth to maturity, with especial attention to economic production. Text-book, Henry's "Feeds and Feeding." Prerequisite, Chemistry 5 or 7. Seniors; 3 lectures. Credit, 3. Mr. QUALFE.

10. **FEEDING AND MANAGEMENT.** — A continuation of Course 9, dealing in a similar manner with horses, sheep, beef cattle and swine. Prerequisite, Course 9. Seniors; 3 lectures. Credit, 2. Mr. QUALFE.

11. **HERD AND STUD-BOOK STUDY.** — An advanced course in the study of the breeds of live stock, familiarizing the student with the detailed history of the breed, the most productive sires and dams of the various breeds, and the successful lines and methods of breeding. Prerequisites, Animal Husbandry 5 and 8. Seniors; 2 hours. Credit, 2. Associate Professor McLEAN.

DAIRYING.

Professor LOCKWOOD, Mr. STORY, Mr. COONS.

Elective Courses.

1. **MILK AND MILK COMPOSITION.** — The development of the dairy business in the United States; the composition, secretion and general characteristics of milk; contamination and fermentation; the study of analysis of milk products by use of the Babcock test for fat, test for acidity and adulteration, and ordinary preservatives; moisture tests for butter; methods for testing herds and developing them to higher efficiency; problems. Two lecture hours and 1 2-hour laboratory period. Credit, 3.

Professor LOCKWOOD.

2. **BUTTERMILKING.** — A study of separators and cream separation; handling milk and cream for buttermaking; preparation of starters, and ripening cream; churning; markets and their requirements; marketing, scoring and judging butter; management; problems; dairy machinery and care thereof. Prerequisite, Course 1; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3. Professor LOCKWOOD and Mr. COONS.

3. **MARKET MILK AND MILK PRODUCTS.** — A study of market milk conditions, extent and development of the business; supply and delivery; food value of milk and its use as food; milk and its relation to the public health; methods for the proper handling and preparing of milk and cream for direct consumption; certified milk, requirements and production; pasteurizing; sterilizing; standardizing and modifying; milk laws and inspection. The manufacture of milk products other than butter, including cheese, condensed milk, cottage cheese, casein, milk powder, ice cream, etc. Prerequisites, Dairying 1, and Bacteriology 1; 2 lecture hours and 1 2-hour laboratory period. Credit, 3. Professor Lockwood.

4. **DAIRYING.** — A course designed primarily for teachers of secondary agriculture. The work given will cover briefly the composition and secretion of milk, the Babcock fat test, the relation of bacteria to dairy work and principles of creaming; separators; elementary buttermaking; proper methods of handling milk and cream; and the relation of market milk to the public health. One lecture hour and 2 2-hour laboratory periods. Credit, 3.

Professor Lockwood.

FARM ADMINISTRATION.

Professor Foord.

Elective Courses.

3. **FARM BUILDINGS AND MACHINERY.** — A study of the material equipment of the farm aside from the land; farm buildings, their location, plan and arrangement; water supply; fencing problems; farm power; farm machinery; wagons. Prerequisites, Agronomy 1, Animal Husbandry 2, Physics 1. Primarily for seniors; 2 laboratory periods and 1 lecture hour. Credit, 3.

Professor Foord.

4. **FARM MANAGEMENT.** — The organization of the farm as a business enterprise. A discussion and study of some of the problems that confront the modern farmer, such as the choice of a farm, systems and types of farming, labor, marketing, records and farm accounts. Prerequisites, Agronomy 1 and 3, Animal Husbandry 2 and 3. Primarily for seniors; 2 lecture or recitation hours and 1 laboratory period. Credit, 3. Professor Foord.

POULTRY HUSBANDRY.

Professor Graham, Mr. Brown.

Elective Courses.

1. **ELEMENTS OF POULTRY CULTURE.** — This course consists of a comprehensive study of poultry-house construction, poultry-house equipment, winter-egg production, types and breeds of poultry. Juniors; 2 lectures. Credit, 2.

Professor Graham.

2. **ELEMENTS OF POULTRY CULTURE.** — This is a continuation of Course 1, treating the subjects of incubation, brooding, care of growing stock, market poultry, including capons, roasters and broilers, and diseases of poultry. Juniors; 2 lectures. Credit, 2.

Professor Graham.

3. **POULTRY PRACTICE WORK.**—This is a practical laboratory course in poultry carpentry, caponizing, killing and picking; dressing and packing poultry, sorting and preparing eggs for market. Must be preceded or accompanied by Course 1. Juniors; 1 laboratory period. Credit, 1.

Mr. BROWN.

4. **INCUBATION AND BROODING.**—In this course students are required to set up and operate incubators and brooders, make a systematic study of the development of the chick in the egg, and the care of sitting hens. This course must be preceded or accompanied by Course 2. Juniors; time to be arranged. Credit, 1 to 3.

Mr. BROWN.

5. **PEN MANAGEMENT.**—This is a practical laboratory course. Students are required to care for a pen of fowls, keeping accurate records of eggs produced, food consumed, weather conditions, health of fowls, and profit and loss; must be preceded or accompanied by Course 1. Juniors; time to be arranged. Credit, 1.

Mr. BROWN.

6. **POULTRY MANAGEMENT.**—In this course a detailed study of large poultry farms and equipment, such as bone cutters, feed cutters, cramming machines, etc., will be carried on. It includes the laying out and planning of poultry buildings of all kinds, the mating of fowls, and the preparing of birds for exhibition. Attention to poultry diseases and investigation work carried on by experiment stations is prominent in this course. A few good poultry plants will be visited by the class for practical demonstrations. Prerequisites, Courses 1, 2, 3 and 4. Seniors; 2 lectures, 1 laboratory period. Credit, 3.

Professor GRAHAM and Mr. BROWN.

7. **ADVANCED POULTRY JUDGING.**—This course includes a study of the origin and history of breeds and varieties, poultry organizations and poultry shows. The American Standard of Perfection will be used as a text. Prerequisites, Courses 1, 2, 3, 4 and 5. Seniors; 1 lecture and 2 laboratory periods. Credit, 3.

Mr. BROWN.

9. **MARKET POULTRY AND POULTRY PRODUCTS.**—This course includes the study of market classifications of poultry, eggs and feathers; the requirements of different markets, methods of marketing, advantages and disadvantages of cold storage of poultry and eggs. Students will be required to fatten several lots of chickens by different methods and rations. Accurate data must be kept showing the gain in weight and quality, also the cost of feed, labor, etc., and the profit and loss. Judging and scoring of market poultry, both alive and dressed, and market eggs will be an important feature of this course. Prerequisites, Courses 1, 2 and 3. Seniors; 1 lecture or conference period and laboratory periods to be arranged. Credit, 3.

Mr. BROWN.

DIVISION OF HORTICULTURE.

Professor WAUGH.

[The general subject of horticulture divides naturally into the subjects of pomology, floriculture, forestry, landscape gardening and market gardening. A number of courses relate to more than one of these subjects, and are therefore grouped here under the general designation of horticulture.]

2. NURSERY PRACTICE. — This course treats of the fundamental methods of plant propagations by seeds, cuttings, budding, grafting, etc. Lectures and practicums. Sophomores, 1 lecture period and 1 laboratory period. Credit, 2.

Assistant Professor CHENOWETH.

Elective Courses (General).

3. PLANT MATERIALS. — This course aims to make the student familiar with the character of the trees, shrubs and herbaceous perennials used in ornamental work, and with the methods of propagating them. Prerequisite, Horticulture 2; 2 lecture periods and 1 laboratory period. Credit, 3.

4. PLANT MATERIALS. — A continuation of Course 3, taking up the field use of trees, shrubs and herbaceous plants, their native habitats, soils and plant associations, with a view to supplying to students in landscape gardening and floriculture a knowledge of plant species. Frequent practicums and field excursions. Prerequisite, Horticulture 3; 2 lecture periods and 1 laboratory period. Credit, 3.

6. PLANT BREEDING. — This course is designed to introduce advanced students to the best modern views of variation, heredity and evolution, and to the best methods of studying the phenomena found in these subjects. The principles educed apply to both animal breeding and plant breeding, but the laboratory work (of which there is considerable) is concerned chiefly with plant life. Some practice work in hybridization and selection is undertaken, and students are trained as far as possible in the practical application of those principles which have direct bearing on the breeding of plants and the cultivation of crops. Seniors and graduates; open only to students well prepared in agricultural or horticultural subjects; 2 lecture periods and 1 2-hour laboratory period. [Not given in 1914-15.] Credit, 3.

FLORICULTURE.

Elective Courses.

1. GREENHOUSE MANAGEMENT. — This course is designed to familiarize students with methods followed in the management of greenhouse crops. The students are instructed in the practical operation of glazing concrete, bench construction, bulb culture, greenhouse watering, fumigating and ventilating, in the care of furnaces, and in the methods of propagation of greenhouse plants by seeds and cuttings. This is designed as a laboratory course,

and students electing it will be expected to arrange their hours according to the needs of the work. Prerequisite, Horticulture 2. Juniors; 7 hours a week. Credit, 4.

2. GREENHOUSE MANAGEMENT. — A continuation of Course 1, including also a study of the location, arrangement and construction of greenhouses; the drawing of plans for commercial and private ranges, to show foundations and details in construction of superstructure; arrangement of heating pipes; estimate of comparative cost of different methods of construction; drafting specifications. Design making and table decorations are considered in this course. Juniors; prerequisite, Floriculture 1; 7 hours as stated under Course 1. Credit, 4.

3. FALL GREENHOUSE CROPS. — A study of important fall and winter crops and their care, — chrysanthemums, carnations, violets, roses, palms and various conservatory plants; the importation, purchase and growth of bulbous material; the preparation of material for forcing; house and church decorating. Lectures, text-books and laboratory exercises. Prerequisites, Floriculture 1 and 2. Seniors; 5 hours. Credit, 3.

4. SPRING GREENHOUSE CROPS. — The culture of individual crops in their relation to spring work in a florist establishment. A critical study of methods of propagating bedding plants, the nature and use of these plants, practice in planting them and in the spring care of herbaceous perennials and wholesale and retail marketing of spring plants. Lectures, text-books and practical exercises. Seniors; prerequisites, Floriculture 1, 2 and 3; 5 hours. Credit, 3.

MICROBIOLOGY.

DR. MARSHALL, DR. VAN SUCHTELEN, MR. ITANO, —————.

Elective Courses.

1, 2. MORPHOLOGICAL, CULTURAL AND PHYSIOLOGICAL MICROBIOLOGY. — Types of micro-organisms, technic of handling, methods of culture and functions of micro-organisms are considered. This course is elementary and fundamental to all applied and special microbiological studies, and therefore is made a prerequisite to all courses offered; 2 hours or 2 credits are assigned to lectures, text-book requirements and recitations; this time will be scheduled. Six hours or 3 credits are assigned to laboratory exercises; only 1 hour of the 6 is scheduled, the remaining 5 hours are arranged with the instructor. Total, 5 credits. Open to juniors and seniors during the fall and spring semesters.

3, 4. AGRICULTURAL MICROBIOLOGY. — This general comprehensive course is designed to cover in an elementary manner those subjects only which confront the student of general agriculture, — the microbiological features of air, water, sewage, soil, dairy, fermentations, food, vaccines, antisera, microbial plant infections, methods and channels of infections, immunity and susceptibility, microbial infections of man and animals, methods of control or sanitary and hygienic practices. These subjects will be demonstrated by illustrative and typical laboratory exercises, which for each subject, on account of time limitations, must be very elementary and greatly restricted. Prerequisite,

Microbiology 1 and 2. Two hours or 2 credits are assigned to lectures, textbook requirements and recitations; this time will be scheduled. Six hours or 3 credits are assigned to laboratory exercises; only 1 hour of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Total, 5 credits. Open to juniors and seniors during the fall and spring semesters.

NOTE. — Courses 1 and 2 are especially adapted to those who wish a general, comprehensive, although elementary, survey of Agricultural Microbiology.

5, 6. ADVANCED MORPHOLOGICAL, CULTURAL AND PHYSIOLOGICAL MICROBIOLOGY. — The purpose of this course is to prepare the student for a more intimate knowledge of microbiological agricultural problems. To accomplish this object it is necessary to provide more advanced technic and methods of culture, together with a more extensive knowledge of micro-organisms and their functions. Prerequisites, Microbiology 1 and 2, 3 and 4; Chemistry 5 and 6. Six hours or 3 credits are assigned to laboratory exercises; only 1 hour of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Total, 3 credits. Open to juniors and seniors in the fall and spring semesters.

7, 8. ADVANCED AGRICULTURAL MICROBIOLOGY. — A knowledge of the subjects mentioned in Courses 3 and 4 cannot be obtained without a more extensive training in microbiological practices, as found in Courses 5 and 6. With this it is possible to continue the work of Course 2. Prerequisites, Microbiology 1 and 2 and 3 and 4, 5 and 6; Chemistry 5 and 6. Six hours or 3 credits are assigned to the laboratory exercises; only 1 hour of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Total, 3 credits. Open to juniors and seniors in the fall and spring semesters.

9, 10. SOIL MICROBIOLOGY. — Such subjects as the number and development of micro-organisms in different soils; the factors which influence their growth, food, reaction, temperature, moisture and aeration; the changes wrought upon inorganic and organic matter in the production of soil fertility, ammonification, nitrification and denitrification; fixation of nitrogen symbiotically and non-symbiotically; methods of soil inoculation receive attention. Prerequisite, Microbiology 1 and 2. Six hours or 3 credits are assigned to laboratory exercises; only 1 hour of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Open to juniors and seniors during the fall and spring semesters.

11, 12. DAIRY MICROBIOLOGY. — Special emphasis will be placed upon milk supplies. The microbial content of milk, its source, its significance, its control; microbial taints and changes in milk; groups or types of organisms found in milk; milk as a carrier of disease-producing organisms; the value of straining, aeration, centrifugal separation, temperature, pasteurization; the abnormal fermentations of milk; bacteriological milk standards and their interpretation; ripening of milk and cream; the bacterial content of butter; a passing survey of the microbiology of cheeses; a study of special dairy products, as ice cream, condensed milk, artificial milk drinks (the products of microbial actions), represents a list of topics considered. Prerequisite, Microbiology 1 and 2, and Dairying 1. Six hours or 3 credits are assigned to labora-

tory exercises; only 1 hour of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Open to juniors and seniors during the fall and spring semesters. (See Dairying 3.)

13, 14. **FOOD MICROBIOLOGY.** — A study of food preservation by means of drying, canning, refrigerating and addition of chemicals will be pursued. Food fermentations, as illustrated by bread, pickles, sauerkraut, ensilage, vinegar, wine, etc., will be examined. Decomposition of foods, as may be seen in meat, oysters, fish, milk, etc., as well as diseased foods, will receive consideration. Contamination of food supplies by means of water, handling, exposure, diseased persons, etc., is of especial significance and will be demonstrated by laboratory exercises. Prerequisite, Microbiology 1 and 2. Six hours or 3 credits are assigned to laboratory exercises; only 1 of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Open to juniors and seniors during the fall and spring semesters.

15, 16. **HYGIENIC MICROBIOLOGY.** — An attempt will be made to select for this course certain material which should be the possession of every individual, and which is basic to public hygiene and sanitation, as applied to man and animals. The microbiology of water supplies, food supplies, vaccines, antisera or antitoxins; the channels by which micro-organisms enter the body, the influence of body fluids and tissues upon them, body reactions with micro-organisms (susceptibility and immunity); the micro-organisms of some of the most important infectious diseases, methods of control, including disinfectants and disinfection, antiseptics, antisepsis and asepsis will be treated. Prerequisite, Microbiology 1 and 2. Six hours or 3 credits are assigned to laboratory exercises; only 1 of the 6 is scheduled; the remaining 5 hours are arranged with the instructor. Open to juniors and seniors during the fall and spring semesters.

FORESTRY.

Professor CLARK.

Elective Courses.

1. **PRINCIPLES OF FORESTRY.** — A lecture course for the purpose of giving the students a general view of the whole field of forestry and what forestry attempts to accomplish and has accomplished. Two lectures; juniors and seniors; not required of students who propose to major in forestry. Credit, 2.

Professor CLARK.

3. **DENDROLOGY.** — During the first part of the semester frequent field trips will be made to identify and study the habits of our native forest trees. Later, the classification, range, distribution, forest habits, quality, uses and identification of wood of the commercial timber trees of the United States will be studied. Two 2-hour periods; lectures, recitations, laboratory or field work at option of instructor; juniors. Credit, 3.

Professor CLARK.

4. **SILVICULTURE.** — Factors influencing forest growth; forest types; silvicultural systems; care and protection of forests; forest description; forest nursery practice and forest planting. Three lectures weekly until May 1; during May and June, 1 lecture and 1 4-hour field period weekly; juniors. Prerequisite, Forestry 3. Credit, 3.

Professor CLARK.

5. **FOREST MENSURATION.** — Methods of determining the volume of trees, logs and entire forests. Methods of computing volume tables, tree and forest growth and yield tables. Timber estimating. Three lectures; 72 hours of field work; seniors. Credit, 5. Professor CLARK.

6. **FOREST VALUATION AND REGULATION.** — Methods of determining the costs of growing timber crops and of arriving at the value of future growth or standing immature growth. Methods of regulating the harvest of crops so as to secure a sustained or annual yield. Prerequisite, Forestry 5; seniors; 3 lectures. Credit, 3. Professor CLARK.

LANDSCAPE GARDENING.

Professor WAUGH, Assistant Professor HARRISON.

Elective Courses.

1. **ELEMENTS OF LANDSCAPE GARDENING.** — Reconnaissance surveys and mapping, with special reference to the methods used in landscape gardening; detailed study of selected designs of leading landscape gardeners; grade design, road design and field work. Students should have preparation in surveying, mathematics, plant materials and drawing. Must be followed by Course 2. Juniors; 6 hours a week. Credit, 3.

Assistant Professor HARRISON.

2. **ELEMENTS OF LANDSCAPE GARDENING.** — As stated under Course 1. Prerequisite, Course 1.

3. **GENERAL DESIGN.** — Field notes; examination of completed works and those under construction; design of architectural details, planting plans, gardens, parks and private grounds; written reports of individual problems. Seniors; prerequisites, Landscape Gardening 1 and 2, and either plant materials (Horticulture 3 and 4) or advanced mathematics; must be followed by Course 4; 6 hours. Credit, 3. Assistant Professor HARRISON.

4. **GENERAL DESIGN.** — As stated under Course 3. Prerequisite, Course 3.

5. **THEORY OF LANDSCAPE ART.** — The general theory and applications of landscape study, including a brief history of the art. Seniors and graduates; 2 hours. Credit, 2. Professor WAUGH.

6. **ARCHITECTURE.** — The history of architectural development, the different historic types, with special reference to the underlying principles of construction and design and their relations to landscape design. Illustrated lectures, conferences, practice in designing; 2 hours. Credit, 2. (Alternating with Course 10 and not to be given in 1913-14.)

Assistant Professor HARRISON.

7. **CIVIC ART.** — The principles and applications of modern civic art, including city design, city improvement, village improvement and rural improvement. Prerequisites, Courses 1, 2 and 3; must be followed by Course 8; 6 hours. Credit, 3. Professor WAUGH.

8. CIVIC ART. — As stated under Course 7. Prerequisite, Course 7.

10. CONSTRUCTION AND MAINTENANCE. — Detailed instruction in methods of construction and planting in carrying out plans, in organization, reporting, accounting, estimating, etc.; maintenance work in parks and on estates, its organization, management, cost, etc. Two hours. Credit, 2. (Alternating with Course 6.) Assistant Professor HARRISON.

MARKET GARDENING.

Mr. GEORGIA.

Elective Courses.

2. ELEMENTS OF MARKET GARDENING. — A course designed for an introduction to market gardening as a business. The work consists primarily of actual field experience in handling vegetable crops from seed to maturity. This is supplemented with lectures and text-book, in which a study of methods, soils, fertilization, tillage and management is made. Juniors; 5 hours. Credit 3. Mr. GEORGIA.

3. ADVANCED MARKET GARDENING. — A continuation of the work begun in Market Gardening 2, taking up problems of seed growing, selection of varieties, crop management, harvesting, storage and marketing. A study is made of the greenhouse vegetable industry, and considerable time devoted to growing the special forced crops. Some time is given to a systematic study of vegetable description, classification and nomenclature. Collateral reading is required. Seniors; prerequisite, Market Gardening 2; 5 hours. Credit, 3. Mr. GEORGIA.

POMOLOGY.

Professor SEARS, Mr. CHENOWETH, Mr. REES.

Elective Courses.

1. PRACTICAL POMOLOGY. — *General.* — A study of the general principles of the growing of fruits, dealing with such questions as selection of site, soils, windbreaks, laying out plantations, choice of nursery stock, pruning, etc. Text and reference books; field and laboratory exercises. Prerequisite, Horticulture 2. Juniors; 4 hours. Credit, 3. Professor SEARS.

2. PRACTICAL POMOLOGY. — *Special.* — The special application of the general principles discussed in Course 1 to the culture of the principal kinds of fruits, such as apples, pears, peaches, plums, cherries and quinces; grape culture and the culture of small fruits, such as blackberries, raspberries, currants, gooseberries and strawberries. Text-books, lectures and reference books; field and laboratory exercises. Prerequisites, Horticulture 2 and Pomology 1. Juniors; 4 hours. Credit, 3. Professor SEARS.

3. SYSTEMATIC POMOLOGY. — A study of the varieties of the different fruits and of nomenclature, with critical descriptions; special reference being given to relationships and classification. Text-books, laboratory and field exercises. Prerequisites, Horticulture 2 and Pomology 1 and 2. Seniors; 4 hours. Credit, 3. Professor CHENOWETH.

4. **COMMERCIAL POMOLOGY.** — The storing and marketing of fruits; includes a discussion of storage houses, the handling and storing of fruits, fruit packages, methods of grading and packing, etc. Text and reference books; laboratory exercises. Seniors; prerequisites, Horticulture 2, Pomology 1, 2 and 3; 4 hours. Credit, 3. Professor CHENOWETH.

6. **SPRAYING.** — A study of (a) spraying materials, their composition, manufacture and preparation for use; the desirable and objectionable qualities of each material, formulas used, cost, tests of purity. (b) Spraying machinery, including all the principal types of pumps, nozzles, hose and vehicles; their structure and care. (c) Orchard methods in the application of the various materials used, with the important considerations for spraying each fruit and for combating each orchard pest. This course is designed especially to familiarize the student with the practical details of actual spraying work in the orchard. Spray materials are prepared, spraying apparatus is examined and tested, old pumps are overhauled and repaired, and the actual spraying is done in the college orchards and small fruit plantations. Prerequisites, Horticulture 2, Pomology 1 and 2. Seniors; 3 hours (1 lecture period and 1 laboratory period). Credit, 2. Professor SEARS.

DRAWING.

Mr. HILLARY.

Elective Courses.

1. **FREEHAND DRAWING.** — Lettering; freehand perspective; sketching from type models, leaves, flowers and trees, houses, etc.; laying flat and graded washes in water colors; water color rendering of leaves, flowers and trees; conventional coloring and map rendering in water colors; conventional signs and mapping in ink. Juniors; 6 hours. Credit, 3.

Mr. HILLARY.

2. **MECHANICAL DRAWING.** — Inking exercises; geometric problems; projection; intersections, isometric; shades and shadows; parallel; angular and oblique perspective; perspective drawing of buildings. Students should have preparation in plane and solid geometry. Juniors; 6 hours. Credit 3.

Mr. HILLARY.

DIVISION OF SCIENCE.

Professor PAIGE.

BOTANY.

Professor STONE, Assistant Professor OSMUN, Mr. McLAUGHLIN, Mr. SMITH.

[The object of the courses in botany is to teach those topics pertaining to the science which have a bearing upon economic and scientific agriculture. Undergraduate work extending through five semesters is offered. Considerable latitude is allowed students in the senior year in their electives; and, besides the courses here outlined, students often take up the study of histology or of systematic botany, the microscopic examination of pure and adulterated human and cattle foods, spices and drugs, etc. Students sufficiently prepared are occasionally permitted to undertake special physiological and pathological investigations. A botanical conference is held monthly wherein new problems in botanical science are considered by graduate students and the seniors who elect botany.]

Required Course.

2. GENERAL BOTANY. — The morphology, physiology and classification of plants. This course is fundamental. Its aim is to lay a foundation for the more specialized courses in botany which follow and to provide a general knowledge of the science for those students who will not take further work in the department. This course is prerequisite to all other courses given by the department. Laboratory work consists in the microscopic study of representatives of all the more important plant groups. This phase of the work is almost entirely devoted to morphology and histology, especial attention being given to the structure of higher plants. The lectures aim to amplify and interpret the laboratory work, dealing also with the function (physiology), classification (taxonomy) and ecology of plants. Each student is required to collect and prepare an herbarium of 75 species of native plants. Gray's "New Manual of Botany" is used in determining and naming plants. Though only 1 lecture period is scheduled for this course, it is understood that laboratory hours may be used for lectures at the discretion of the instructor. Sophomores; 1 lecture; 3 laboratory periods. Credit, 4.

Assistant Professor OSMUN and Mr. McLAUGHLIN.

Elective Courses.

3. CRYPTOGAMIC BOTANY. — Systematic study of typical forms of the lower plants (bacteria, algæ, fungi, lichens, mosses and ferns); instruction in laboratory technique and methods, and the making of herbaria of lichens, mosses and ferns. Laboratory work and lectures; field excursions for the purpose of observing environmental habits and collecting material for laboratory study; collateral reading. This course is intended for those students who wish to specialize in biology; its purpose is to afford more thorough scientific training than is offered in Course 5, and students electing this course may attend the lectures in Course 5. Prerequisite, Botany 2. Primarily for juniors. One lecture hour and 3 2-hour laboratory periods. Credit, 4.

Assistant Professor OSMUN.

4. CRYPTOGAMIC BOTANY. — This is a continuation of Course 3. Prerequisites, Botany 2 and 3. Primarily for juniors; 1 lecture hour and 2 2-hour laboratory periods. Credit, 2.

Assistant Professor OSMUN.

5. PLANT PATHOLOGY. — This course comprises a study of the common diseases of crops and consideration of the methods for their prevention and control, and is intended especially for students in horticulture and agriculture. Laboratory work and lectures. Prerequisite, Botany 2. Primarily for juniors; 1 1-hour lecture and 1 2-hour laboratory period. Credit, 2.

Professor STONE, Assistant Professor OSMUN and Mr. McLAUGHLIN.

7. PLANT PATHOLOGY. — This course includes a study of the diseases of one or more crops and the methods of controlling them. Laboratory work and lectures, together with extensive reading of experiment station literature. The course is intended for those who wish to become more familiar with the diseases of one or more groups of economic plants. Prerequisite, Botany 2. Seniors; students who take this course and continue in botany must take Course 8; 1 lecture period and 3 3-hour laboratory periods. Credit 5.

Professor STONE.

8. PLANT PATHOLOGY. — As stated in Course 7. Prerequisite, Course 7.

9. ECONOMIC FUNGI. — This course comprises the study of economic fungi from a technical point of view, and is intended for those students who wish for a more comprehensive knowledge of the phylogenetic relationship of fungi. Laboratory work and lectures. Problems of a practical or technical nature intimately associated with the control of diseases are taken up. Special monographs and more important station literature treating of the life history of fungi, etc., are studied. Prerequisites, Botany 2, 3 and 4. Must be followed by Course 10; seniors; 1 1-hour lecture period and 2 or 3 3-hour laboratory periods. Credit, 4 or 5.

Professor STONE.

10. ECONOMIC FUNGI. — As stated in Course 9. Prerequisite, Course 9.

11. PLANT PHYSIOLOGY. — This course is largely experimental and is especially adapted to the needs of students who are taking chemistry. Laboratory work and lectures; various handbooks on plant physiology. Prerequisite, Botany 2. Must be followed by Course 12; seniors; 1 1-hour lecture period and 3 3-hour laboratory periods. Credit, 5.

Professor STONE and Mr. McLAUGHLIN.

12. PLANT PHYSIOLOGY. — As stated in Course 11. Prerequisite, Course 11.

13. SHADE-TREE MANAGEMENT. — Physiology and pathology of shade trees. This course includes a comprehensive study of the diseases, structure and functions of trees and shrubs, and of every agency which in any way affects shade trees. Laboratory work and lectures; extensive reference reading. Designed for those students who intend to take charge of parks or large estates, or to become tree wardens, city foresters, landscape gardeners or professional advisers and caretakers. Prerequisite, Botany 2. Must be followed by Course 14; seniors; 1 1-hour lecture period and 2 3-hour laboratory periods. Credit, 4.

Professor STONE.

14. SHADE-TREE MANAGEMENT. — Physiology and pathology of shade trees. As stated in Course 13. Prerequisite, Course 13.

15. HISTOLOGICAL TECHNIQUE. — This course comprises training in general histological methods, including the use of precision microtomes, various methods of killing, fixing, sectioning, staining and mounting of plant materials. This is a technical course in histology, of value to students intending to become research or teaching botanists. It is recommended for students taking Courses 9 and 10, as an aid to the study of relationship between host and parasite, and is open to those taking Courses 13 and 14 who desire to make their studies in tree structure more comprehensive than provided for in these courses. Collateral reading and conferences. Prerequisites, Botany 2, 3 and 4. Seniors; 3 or 5 2-hour laboratory periods. Credits, 3 or 5.

Assistant Professor OSMUN.

16. HISTOLOGICAL TECHNIQUE. — This is a continuation of Course 15. Prerequisite, Course 15. Seniors; 3 or 5 2-hour laboratory periods. Credits, 3 or 5.

Assistant Professor OSMUN.

GENERAL AND AGRICULTURAL CHEMISTRY.

Professors LINDSEY, WELLINGTON and CHAMBERLAIN, Associate Professor PETERS, Assistant Professor ANDERSON, Messrs. BOGUE, FOWLER, SEREX, ROBINSON and BROWN.

[The course in chemistry aims to teach accurate observation, logical thinking and systematic and constant industry. It likewise aims to give those students following the several agricultural occupations, or who are preparing themselves for work as teachers and investigators in the other sciences, a knowledge of the subject sufficient to enable them to apply it in their various lines of work. Students taking all of the undergraduate courses and who intend following chemistry as a vocation are prepared for positions as instructors in high schools and colleges, in the agricultural experiment stations, the United States Department of Agriculture, as well as in fertilizer, cattle food, sugar and dairy industries. Students are encouraged to take graduate work leading especially to the degree of M.Sc., and to thus prepare themselves for advanced positions as teachers in the agricultural colleges, as research chemists, and likewise for the more responsible positions connected with the different agricultural industries of the country. A fuller knowledge of the course of instruction will be found by consulting the following outline.]

Required Courses.

1. GENERAL CHEMISTRY. — *The Non-metals.* — An introduction to the fundamental chemical laws, together with a study of the common acid forming elements and their compounds. Kahlenberg's "Outlines of Chemistry" is used as a text. The laboratory work is of two kinds. Those beginning the subject form one division and those who present chemistry for entrance are grouped in other divisions. The advanced divisions, in addition to work not usually done in high schools, study simple volumetric quantitative processes such as the determination of the hardness of water, the available oxygen in hydrogen peroxide, the chlorine in soluble chlorides, the oxygen in bleaching powder and the strengths of solutions of acids and bases. Freshmen; lectures, 2 hours; laboratory, 2 hours. Credit, 3.

Associate Professor PETERS, Assistant Professor ANDERSON,
Mr. BOGUE and Graduate Assistants.

2. GENERAL CHEMISTRY. — *The Metals.* — A continuation of Course 1. A study of the metals and their compounds. The laboratory work takes the synthetic form. Substances of agricultural importance are prepared in quantity and studied in detail by the student. These include ammonium sulfate from gas liquor, sulfur and arsenic insecticides and superphosphates,

in addition to preparations outlined in Blanchard's "Synthetic Inorganic Chemistry." Attention is paid to the subjects of mass action and colloids. Prerequisite, Course 1. Freshmen; lectures, 2 hours; laboratory, 2 hours. Credit, 3.

Assistant Professor ANDERSON, Associate Professor PETERS,
Mr. BOGUE and Graduate Assistants.

Elective Courses.

3. QUALITATIVE ANALYSIS. — *Basic.* — A course in the systematic analysis of metallic salts, presented from the ionic viewpoint. The student studies closely the tests used in the separation and identification of the metals; he then applies these tests to unknown mixtures. Text, Medicus' "Qualitative Analysis," with Böttger's "Qualitative Analysis" and Treadwell-Hall's "Qualitative Analysis" for reference. Prerequisite, Course 2; should be taken, particularly, by all intending to follow chemistry as a vocation. Sophomores; lecture, 1 hour; laboratory, 4 hours. Credit, 3.

Assistant Professor ANDERSON and Mr. SEREX.

4. QUALITATIVE ANALYSIS. — *Acidic.* — A continuation of Course 3. A large part of the semester is spent in the examination qualitatively of minerals and of agricultural products. Prerequisite, Course 3. Sophomores; lecture, 1 hour; laboratory, 4 hours. Credit, 3.

Assistant Professor ANDERSON and Mr. SEREX.

5. ORGANIC CHEMISTRY. — This course, with Course 6, continues through the junior year. The two courses are designed especially: (1) for those who are looking forward to positions as chemists in agricultural colleges or experiment stations, the United States Department of Agriculture, or similar places, and who need a knowledge of chemistry for itself; and (2) for those who are expecting to enter like positions in other sciences, and who will use their knowledge of chemistry in a secondary way. It consists of a systematic study, both from texts and in the laboratory, of the more important compounds in the entire field of organic chemistry. Especial attention is given to those compounds which are found in agricultural products or are manufactured from them. These include alcohols, acids, esters, fats, carbohydrates, proteins, etc. The work forms a foundation for courses in physiological chemistry and agricultural analysis, and thus for future work in agricultural chemical investigation. Prerequisites, Courses 1, 2, 3 and 4 (courses 3 and 4 will not be required as prerequisites for those majoring in other courses than chemistry). Juniors; those electing Course 5 are expected to elect Course 6. Lectures, 3 hours; laboratory, 4 hours. Credit, 5.

Professor CHAMBERLAIN and Mr. FOWLER.

6. As stated under Course 5.

Professor CHAMBERLAIN and Mr. FOWLER.

7. AGRICULTURAL CHEMISTRY. — This course and Course 8 are designed as alternatives for Courses 5 and 6. They are especially intended for those who, having completed Courses 1 and 2, do not care to continue the study of chemistry for itself, but are planning to enter practical agricultural work and desire a further knowledge of chemistry as it is related directly to practical

agriculture and agricultural problems. The work is planned in two parts, viz.: *Course 7, Inorganic Agricultural Chemistry*, the study of the general composition, properties and reactions of soils and fertilizers, and in addition to this the study of some of the more important fungicides and insecticides, and the common materials of construction, such as tile, brick, cements, paints, oils, etc.; and *Course 8, Organic Agricultural Chemistry*, the study of the composition, physiological processes, uses and nutritive value of plants, and the composition and general processes of nutrition and growth of animals; also the study of products related to plants and animals, such as milk, butter, sugar, maple syrup, denatured alcohol, wood pulp, paper, etc. The treatment of the subject in both of these courses is entirely general, avoiding all complicated chemical facts and relationships, and endeavoring simply to make the student acquainted with the chemical aspects of agricultural processes and products. Prerequisites, Courses 1 and 2. Juniors; those electing Course 7 are expected to elect Course 8. Lectures, 2 hours; laboratory, 2 hours. Credit, 3. Professor WELLINGTON and Mr. FOWLER.

8. ORGANIC AGRICULTURAL CHEMISTRY. — As stated under Course 7.

Professor CHAMBERLAIN and Mr. FOWLER.

9. QUANTITATIVE ANALYSIS. — Instruction in this course includes the gravimetric and volumetric determinations of some of the commoner metals and non-metals in minerals and industrial products. Aside from teaching accurate observation and care in manipulation, it is intended for those who would learn the exact methods for determining the elements, particularly, in inorganic substances, and is the forerunner of other courses intended to fit men to become expert analysts. Talbot's "Quantitative Chemical Analysis" is used as a text. Prerequisites, Courses 1, 2, 3 and 4. Juniors; lecture, 1 hour; laboratory, 8 hours. Credit, 5.

Professor WELLINGTON and Assistant.

10. AGRICULTURAL CHEMICAL ANALYSIS. — In this course and Course 11 the methods previously studied, and other approved methods, are applied to the examination of agricultural materials. The analysis of fertilizers, insecticides, fungicides and soils is followed by that of cattle foods, dairy products, sugars, starches and allied substances. Prerequisite, Course 9. Juniors; lecture, 1 hour; laboratory, 8 hours. Credit, 5.

Professor WELLINGTON and Assistant.

11. AGRICULTURAL CHEMICAL ANALYSIS. — As stated under Course 10. Prerequisite, Course 10. Seniors; lecture, 1 hour; laboratory, 8 hours. Credit, 5.

Associate Professor PETERS and Assistant.

13. PHYSIOLOGICAL CHEMISTRY. — This course is intended to be supplementary to Courses 5 and 6 and Courses 7 and 8. To those who expect to take up scientific work in botany, agronomy, animal husbandry, bacteriology, etc., and who have had Courses 5 and 6, it will give acquaintance with the chemistry of the physiological processes in plants and animals, by means of which some of the important organic compounds studied in Courses 5 and 6 are built up in the living organism or are used as food by it. In the lectures the study of food and nutrition as related to both human and domestic ani-

mals is the principal subject. In the laboratory, experimental studies are made of the animal body and the processes and products of digestion, secretion and excretion. The course gives additional training in the chemical problems of agricultural experiment station work, especially those connected with investigations in animal and plant nutrition. To those who will not take up scientific lines of work, but will follow practical agriculture, it will give an opportunity for a more detailed study of the chemistry and physiology of problems which were treated generally in Courses 7 and 8. Prerequisites, preferably, Courses 5 and 6 or 7 and 8. Seniors; lectures, 2 hours; laboratory, 2 hours. Credit, 3. Professor CHAMBERLAIN and Mr. FOWLER.

15. PHYSICAL CHEMISTRY. — A résumé of general chemistry from the viewpoint of physical chemistry and the application of physical chemistry to agricultural chemistry. Prerequisite, Course 9. Juniors and seniors; lectures, 2 hours; laboratory, 2 hours. Credit, 3.

Assistant Professor ANDERSON and Mr. SEREX.

[GENERAL STATEMENT CONCERNING COURSES 12, 14 AND 16. — Each student electing either of these courses will be required to take up and follow out some special line of work, the object being to acquaint him with methods of original inquiry. A single concrete example may be found in a comparative study of the different methods for the determination of the several forms of nitrogen. A thesis may not be required, but frequent consultation of the literature bearing on the subject will be necessary. These courses are valuable for all chemists, and particularly so for those intending to take up experiment station work. A student may choose any one but not two of these separate courses.]

12. SPECIAL WORK IN AGRICULTURAL CHEMICAL ANALYSIS. — Topics for laboratory study will be assigned to each student. Prerequisite, Course 11. Seniors; laboratory, 10 hours. Credit, 5. Associate Professor PETERS.

14. SPECIAL WORK IN PHYSIOLOGICAL AND ORGANIC AGRICULTURAL CHEMISTRY. — In this course, as in Courses 12 and 16, the student will be able to give his attention primarily to one line of chemical study. To those whose tastes and interests are in connection with the organic and physiological problems of agricultural chemistry, many subjects of study present themselves, among which may be mentioned: proteins, carbohydrates, fats, organic nitrogenous compounds in fertilizers and soils and their relation to plants, the commercial production of alcohol from agricultural products, digestion and dietary studies, etc. Prerequisites, Courses 5, 6 and 13. Seniors; laboratory, 10 hours. Credit, 5. Professor CHAMBERLAIN.

16. SPECIAL WORK IN PHYSICAL CHEMISTRY. — The field of agricultural chemistry offers many problems that have been attacked through the methods of physical chemistry; such, for example, are the hydrolysis of salts and of minerals and the absorption of salts and fertilizers by soils. Each student will select one line of work and follow it through the course, repeating some of the original work. Prerequisite, Course 15. Laboratory, 10 hours. Credit, 5. Assistant Professor ANDERSON.

18. HISTORY OF CHEMISTRY. — An exposition of the development of chemical knowledge from the earliest times to the present. Although the entire history will be included, the larger portion of it will receive only brief

mention in order that the questions of vital interest in modern life and industry may be studied at greater length. Particular attention will be given to the questions of plant and animal industry. Chemists are strongly advised to take this course. Seniors; lectures, 2 hours. Credit, 2.

Professor WELLINGTON.

ENTOMOLOGY.

Professor FERNALD, Associate Professor CRAMPTON, Assistant Professor GATES, Mr. MARTIN,

Elective Courses.

1. GENERAL AND ECONOMIC ENTOMOLOGY. — Course 1 comprises a general introduction to the study of insects, including studies on their structure as applied to their identification; the principles of classification; a systematic examination of the different groups and of the most important economic insects of each group, including their life histories and habits, recognition of their work as shown in the collections, and methods for their control. The most important insecticides and their preparation and application are also treated. Students electing Course 1 are expected to take Course 2. Juniors; 3 lecture periods. Credit, 3.

Professor FERNALD.

2. GENERAL AND ECONOMIC ENTOMOLOGY. — A continuation of Course 1, with laboratory and field work on methods of collecting, preserving and studying insects and their work. Juniors; 2 laboratory or field periods. Credit, 3.

Professor FERNALD.

3. ADVANCED ENTOMOLOGY. — This course is subdivided, the time spent on the various subdivisions differing somewhat according to the particular needs of those taking it; and it is to a large degree given in the form of individual instruction, special attention being paid to the pests attacking the particular crops in which the student is most interested. The student may specialize in fruit pests, market-garden pests, greenhouse pests, field crop pests, etc., to a large extent, in accordance with his plans for future work.

A. *Morphology*. — Careful studies of the structure of insects belonging to each of the larger and more important orders, together with lectures on the subject, followed by the identification of insects of each of these groups and the study of the collections, to teach the use of the analytical tables and of structural characters in the determination of insects.

B. *Histology*. — Lectures on the internal anatomy and histology of the various organs, with particular reference to those affected by the various insecticides.

C. *Insecticides and Apparatus*. — Lectures on the chemistry, preparation and application of the different insecticides, their merits and defects; tests for detecting adulterations; comparative tests of nozzles and other apparatus; and a study of other methods of insect control, together with laboratory work.

D. *Coccidology*. — Laboratory work on methods of preserving, mounting and identifying scale insects, particular attention being given to those of greatest economic importance.

E. *Bibliography*. — Studies of the various entomological publications and of the methods of finding the literature on any insect.

F. Special Studies. — In these studies the insects most closely related to the future occupation of the student will receive attention. The results of these studies are brought together in the form of an essay or thesis; this will include all the essentials of what is known of the life history, habits and injuries caused by each insect studied, together with methods of treatment, and a list of the best articles found in the course of the work. Comstock's "Manual for the Study of Insects" is used in the laboratory work. Seniors; prerequisite, Entomology 2; students electing Course 3 are expected to take Course 4; 1 1-hour lecture period and 3 2-hour laboratory or field periods. Credit, 4.

Professor FERNALD, Associate Professor CRAMPTON, Mr. MARTIN.

4. ADVANCED ENTOMOLOGY. — As stated in Course 3. Prerequisite, Course 3.

5. FOREST INSECTS. — A study of insects injurious to forest trees and of methods for their control, with laboratory and field work on these insects, and a study of what has been published about them. Seniors; prerequisites, Entomology 1 and 2; 1 lecture and 2 2-hour laboratory or field exercises. Credit, 3.

Professor FERNALD.

8. BEEKEEPING. — This course comprises a general consideration of the biology of the honey bee and the elements of practical beekeeping. Some topics covered are: life history, general behavior and instincts, structure, products, relations of bees to plants, the honey flora. The course aims particularly to afford first-hand, practical experience with bees, to the end of enabling their proper maintenance for any purpose, horticultural, educational or apicultural. Bee diseases, a thorough understanding of which is fundamental, are emphasized. So far as possible the work is made individual in constructing materials and apparatus and in the manipulation of bees. Juniors; seniors may elect. Courses 1 and 2 form a desirable preparation; 2 lectures, 1 2-hour laboratory period. Credit, 3.

Assistant Professor GATES and Mr. —.

10. ADVANCED BEEKEEPING. — This course deals with the advanced and special problems of the beekeeper. Besides considering those difficulties which at present confront the industry, subjects necessarily of limited treatment in the previous course are expanded for the development of particular technique and manipulation. Apiary management, including the principles of queen rearing, are practiced. The course should further qualify for apicultural instruction and inspection service, affording familiarity with the special literature and methods needed in investigation and research. The policy of individual instruction is continued in so far as practicable. Primarily for seniors, but juniors may elect; prerequisite, Course 8; 1 lecture, 1 2-hour laboratory period. Credit, 2.

Assistant Professor GATES and Mr. —.

11. EVOLUTION. — In order to demonstrate the universal scope and operation of the laws of evolution, the course includes a brief sketch of the probable origin and evolution of matter as viewed in the light of modern physical and

chemical research; the evolution of the solar system, leading to the formation of the earth; the changes in the earth, preparatory to the production of life; the physical and chemical basis of life; the probable steps in the formation of living matter, and the theories concerning it; the evolution of living things; the appearance of man; his future in the light of his past development; and the evolution of human institutions and ideas. Consideration is also given to the theories concerning the factors of evolution, the general problems of heredity and similar topics. The course closes with a brief discussion of the philosophical, moral and social aspects of the problems involved, and the influence of the idea of evolution upon modern thought. The lectures are supplemented by collateral reading; and a portion of the time is used for the purpose of demonstration, or discussion by the class. Seniors; juniors may elect. Two lecture periods. Credit, 2.

Associate Professor CRAMPTON.

MATHEMATICS AND CIVIL ENGINEERING.

Professor OSTRANDER, Mr. DUNCAN, Mr. MACHMER, Mr. HAZELTINE.

Required Courses.

1. HIGHER ALGEBRA. — A brief review of radicals, quadratic equations, ratio and proportion, and progressions; graphs, binomial theorem, undetermined coefficients, summation of series, continued fractions, determinants, permutations and combinations, logarithms, theory of equations. Reitz and Crathorne's "College Algebra." Freshmen; 3 hours a week. Credit, 3. Mr. DUNCAN, Mr. MACHMER and Mr. HAZELTINE.

2. HIGHER ALGEBRA. — As stated under Course 1. Mr. MACHMER.

3. SOLID GEOMETRY. — Theorems and exercises on the properties of straight lines and planes, dihedral and polyhedral angles, prisms, pyramids and regular solids; cylinders, cones and spheres; spherical triangles and the measurement of surfaces and solids. Wentworth and Smith's "Solid Geometry." Freshmen; required unless accepted for admission; 2 hours a week. Credit, 2. Mr. DUNCAN, Mr. MACHMER and Mr. HAZELTINE.

4. PLANE TRIGONOMETRY (in Charge of Department of Physics). — The trigonometric functions as lines and ratios; proofs of the principal formulas, transformations; inverse functions, use of logarithms; the applications to the solution of right and oblique triangles; practical applications. Bowser's "Elements of Plane and Spherical Trigonometry." Freshmen; 3 hours. Credit, 3. Professor HASBROUCK and Assistant Professor ROBBINS.

Elective Courses.

5. MENSURATION AND COMPUTATION. — An elective, 3 hours per week, during the first semester, junior year. The course includes a review of methods of computation, with special emphasis on short and abbreviated processes, together with methods of checking computations and of forming close approximations; use of slide rule.

Also the graph, mensuration of plane and solid figures, weights and measures and elementary mechanism. Numerous practical problems are selected from such subjects as the following: the mathematics of wood working; rough lumber; general construction; forestry methods in heights of trees; pulleys, belts and speeds; power and its transmission; dairying; agronomy; computation of areas from simple measurements. Three hours. Credit, 3.

Mr. MACHMER.

6. PLANE SURVEYING. — The elements of the subject, including the adjustment and use of the usual instruments. Text-book and lectures. Sophomores; 6 hours a week. Credit, 3. Mr. DUNCAN and Mr. HAZELTINE.

7. ANALYTIC GEOMETRY. — A discussion of the geometry of the line, the circle, of conic sections and of the higher plane curves. Fine and Thompson's "Coördinate Geometry." Prerequisites, Mathematics 1, 2, 3 and 4. Primarily for juniors; 3 hours a week. Credit, 3.

Professor OSTRANDER.

8. DIFFERENTIAL AND INTEGRAL CALCULUS. — A first course in the subject, with some of the more important applications. Nichol's "Differential and Integral Calculus." Prerequisites, Mathematics 1, 2, 3, 4 and 7. Primarily for juniors; 5 hours. Credit, 5.

Professor OSTRANDER.

10. ROADS AND RAILROADS. — Topographic and higher surveying, highway construction, earthwork, pavements and railroad construction. Text-book and lectures; 6 hours. Credit, 5.

Professor OSTRANDER.

11. HYDRAULICS AND SANITARY ENGINEERING. — Hydrostatics, theoretical hydraulics, orifices, weirs, pipes, conduits, water supply, hydraulic motors, sewers and sewage treatment. Text-book and lectures; 3 hours. Credit, 3.

Professor OSTRANDER.

12. ELEMENTARY STRUCTURES. — An elementary course in roofs and bridges. Text-book and lectures; 6 hours. [Not given in 1913-14.] Credit, 5.

Professor OSTRANDER.

13. MATERIALS OF CONSTRUCTION, FOUNDATIONS AND MASONRY CONSTRUCTION. — Text-book and lectures; 4 hours. [Not given in 1913-14.] Credit, 3.

Professor OSTRANDER.

15. APPLIED MECHANICS. — A course in applied mechanics, based on the calculus, with problems. Text-books and lectures. Prerequisites, Mathematics 7, 10; 3 hours. Credit, 3.

Professor OSTRANDER.

PHYSICS.

Professor HASBROUCK, Assistant Professor ROBBINS.

[The fundamental and basic importance of the laws and phenomena of physics makes necessary no explanation of the introduction of this subject into the curriculum of an agricultural college. The logical development of the subject emphasizes the importance of physics as a science in itself. Special emphasis is laid, however, on the correlation of the principles studied with the sciences of agriculture, botany, chemistry, zoölogy, thus furnishing an extra tool by use of which the student's work in all the subjects may be more effective.]

Required Course.

1. GENERAL PHYSICS. — General physics covers mechanics of solids, mechanics of fluids, wave motion and heat. These topics are chosen for the required work because they are regarded as the most fundamental of all, and there is no part of the work in physics more necessary for the student who plans to take up practical farming. Course given by text-book and lectures. Sophomores; 4 hours class-room work and 1 laboratory period. Credit, 5. Professor HASBROUCK and Assistant Professor ROBBINS.

Elective Courses.

2. GENERAL PHYSICS. — Electricity and light. Text-book, lectures, recitations and laboratory work. Sophomores; 2 hours of class-room work and 1 laboratory period. Credit, 3. Assistant Professor ROBBINS.

3. ELECTRICITY, HEAT AND LIGHT. — Three-hour lecture and laboratory course open to juniors and seniors; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3. Assistant Professor ROBBINS.

4. Continuation of Course 3, open to juniors and seniors; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3. Assistant Professor ROBBINS.

[Mathematics 4 (trigonometry) is, for convenience of grouping, listed under Mathematics, although in charge of the Department of Physics.]

VETERINARY SCIENCE.

Professor PAIGE, Associate Professor GAGE.

[The courses in veterinary science have been arranged to meet the needs of students who propose following practical agriculture, and of prospective students of human and comparative medicine.]

*Elective Courses.**First Semester.*

1. VETERINARY HYGIENE AND STABLE SANITATION. — This course is intended to familiarize the student with the relation of water, food, air, light, ventilation, care of stables, disposal of excrement, individual hygiene, etc., to the prevention of disease in farm animals. Juniors and seniors; 3 hours. Credit, 3. Professor PAIGE.

3. COMPARATIVE (VETERINARY) ANATOMY. — The anatomy of the horse is studied in detail, and that of other farm animals compared with it where differences exist. This course is essential for those students wishing to elect Course 4. Juniors and seniors; 3 hours. Credit, 3. Professor PAIGE.

5. **ESSENTIALS OF GENERAL PATHOLOGY.** — This course is planned to introduce the student to some of the essential anatomical, histological and general physiological phenomena essential to the understanding of some of the simple general pathological conditions found in domestic animals. Some of the common methods of diagnosis will be considered in the laboratory. The various chemical and biological reactions and tests will be presented from the standpoint of pure science, showing applications of chemistry and biology. The course will serve to liberally educate and stimulate in the student of agriculture the appreciation of some of the methods used in animal pathology for detecting and controlling some of the more common animal diseases. Lectures, demonstration and laboratory work. Juniors and seniors; 2 3-hour laboratory periods. Credit, 3. Associate Professor GAGE.

7. **AVIAN PATHOLOGY (COURSE IN POULTRY DISEASES).** — The object of this course is to present information concerning the common diseases of poultry, their etiology, diagnosis and prevention. The work will consist of a systematic study of the diseases of the alimentary tract, liver and abdominal region, followed by a study of the diseases of the respiratory system, circulation and kidneys. The important disease-producing external and internal parasites will be considered; also diseases of the skin and reproductive organs. Lectures and demonstrations. Juniors and seniors; 2 3-hour laboratory periods. Credit, 3. Associate Professor GAGE.

Second Semester.

2. **GENERAL VETERINARY PATHOLOGY, MATERIA MEDICA AND THERAPEUTICS.** — In this course such fundamental and general pathological conditions are studied as inflammation, fever, hypertrophy, atrophy, etc., a knowledge of which is essential in the diagnosis, prevention and treatment of disease. The course in Pathology is followed by one in Materia Medica and Therapeutics, dealing with the origin, preparation, pharmacology, pharmacy, administration and therapeutic use of the more common drugs. Poisonous plants and symptoms and treatment of plant poisoning are also considered. Juniors and seniors; 3 hours. Credit, 3. Professor PAIGE.

4. **THEORY AND PRACTICE OF VETERINARY MEDICINE; GENERAL, SPECIAL AND OPERATIVE SURGERY.** — A course intended to familiarize the student with the various medical and surgical diseases of the different species of farm animals. Particular attention is given to diagnosis and first-aid treatment. The student is taught the technic of simple surgical operations that can with safety be performed by the stock owner. This course should be preceded by Course 3, and taken in conjunction with Course 2. Lectures, demonstrations and practice. Juniors and seniors; 3 hours. Credit, 3.

Professor PAIGE.

6. **ESSENTIALS OF GENERAL ANIMAL PATHOLOGY.** — This is a continuation of Course 5, and is devoted to a study of some of the common pathological conditions by means of prepared sections, the aim being to demonstrate to the student abnormal animal histological structures commonly observed when material from various cases of animal diseases is prepared for microscopical study. Some of the biological products used in protecting animals against disease will be considered. Juniors and seniors; 2 3-hour laboratory periods. Credit, 3. Associate Professor GAGE.

ZOÖLOGY AND GEOLOGY.

Associate Professor GORDON, Mr. BLANCHARD.

ZOÖLOGY.*Required Course.*

1. **ELEMENTARY ZOÖLOGY.**—This course presents the underlying principles of biology and the zoölogical part of an introductory course. Laboratory dissection and lectures. Sophomores; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3.

Associate Professor GORDON and Mr. BLANCHARD.

Elective Courses.

3. **INVERTEBRATE OR VERTEBRATE ZOÖLOGY.**—These are separate courses running throughout the year. They are scheduled for the same hour. The student may elect one or the other, but not both in the same year. The course in invertebrate zoölogy is designed primarily for students who are planning to take up entomology, but is open to any one. The course in vertebrate zoölogy deals with comparative vertebrate anatomy and physiology and is designed for those who desire or require a knowledge of the comparative anatomy and physiology of vertebrated animals. Each course includes laboratory, text-book and lecture work. These courses are scheduled in the junior year, but are open to seniors; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3. Hours by arrangement.

Associate Professor GORDON and Mr. BLANCHARD.

4. **INVERTEBRATE AND VERTEBRATE ZOÖLOGY.**—The continuation and completion of Course 3 of the first semester; 1 lecture hour and 2 2-hour laboratory periods. Credit, 3.

Associate Professor GORDON and Mr. BLANCHARD.

5. **ADVANCED ZOÖLOGY.**¹—Elective work in advanced zoölogy is offered to seniors who are interested in zoölogy or who are looking forward to advanced work in any department of zoölogy or allied branches; 2 1-hour periods and 3 2-hour periods during the fall semester. Credit, 5. Hours by arrangement.

Associate Professor GORDON and Mr. BLANCHARD.

6. **ADVANCED ZOÖLOGY.**¹—This course may be a continuation of the work of the first semester or of separate character; 1 1-hour period and 2 2-hour periods during the spring semester. Credit, 3. Hours by arrangement.

Associate Professor GORDON and Mr. BLANCHARD.

GEOLOGY.*Elective Course.*

2. **ELEMENTARY GEOLOGY.**—Rock-forming minerals; rock types; rock weathering; dynamical, structural and surface geology. Lectures, map and field work. Sophomores; 1 1-hour period and 2 2-hour periods. Credit, 3.

Associate Professor GORDON and Mr. BLANCHARD.

¹ The work offered in Courses 5 and 6 may apply on a minor for the degrees of master of science or doctor of philosophy.

DIVISION OF THE HUMANITIES.

Professor SPRAGUE.

ECONOMICS AND SOCIOLOGY.

Professor SPRAGUE.

[The courses in Economics and Sociology are planned with the purpose of giving the student that knowledge and understanding of the important factors and problems in this field of study and life which every active citizen and educated man ought to have.]

Required Course.

1. **POLITICAL ECONOMY.** — An introductory course which takes up the study of the nature and scope of economics, the evolution and organization of the present economic system, and the fundamental principles of production, exchange and consumption. The class will study and discuss such topics as wealth, value, capital, interest, profits, wages and labor, tariffs, trusts, etc. Debates on current economic problems will be organized in the class. Text-book, library readings, lectures and discussions. Arranged primarily for juniors; open to seniors; 3 hours. Credit, 3. Professor SPRAGUE.

Elective Courses.

2. **INDUSTRIAL PROBLEMS.** — This is a course in the most important industrial problems of the day, covering the methods of organizations of labor and capital, systems of industrial remuneration, means of securing industrial peace, legal status of labor unions and their activities, protective legislation for workmen and employers, the problems of immigration, the sweated industries, prison labor, child labor and industrial education. Text-book, with collateral readings, lectures and discussions; 3 hours. Credit, 3.

Professor SPRAGUE.

4. **ANTHROPOLOGY; THE HISTORY OF HUMAN CIVILIZATION.** — The evolutionary origin and history of man; characteristics of primitive men, departure from the animal status, and the beginnings of civilization; development of industries, arts and sciences; the growth of languages, warfare, migrations and social institutions; a study of the powerful natural and human forces that have brought man from the early stages to modern conditions; characteristics of the leading races of the world. These topics will constitute the subject-matter of the course. Arranged for sophomores and juniors. Library readings, text-book and lectures; 3 hours. Credit, 3.

Professor SPRAGUE.

5. **PUBLIC FINANCE, MONEY AND BANKING.** — This course follows Economics 1. It will take up taxation and the various systems for collecting public revenue in Europe and America, with the problems involved; the history of money and the systems of banking and finance now in operation; the causes and problems of economic crises and depressions; the currency problems of the United States. For juniors and seniors. Readings, lectures and discussions; 3 hours. Credit, 3. Professor SPRAGUE.

7. SOCIAL INSTITUTIONS AND SOCIAL PROBLEMS. — This course is devoted to the study of the social institutions, such as the family, the church, State and property; and to such current social problems as divorce, race suicide, crime and prison reform, poverty and its relief. Considerable time is given to the study of eugenics in its social significance and possibilities. The correctional and charitable institutions of Massachusetts are studied in some detail. The later weeks of the term are devoted to a short introduction to sociological theory. Arranged especially for seniors; open to juniors by permission. Readings, lectures, discussions; 3 hours. Credit, 3.

Professor SPRAGUE.

8. MODERN SOCIAL REFORM MOVEMENTS. — The history of property and its vital issues in modern times; the socialistic systems, anarchy and communism; systems of workingmen's insurance in Europe and America, and other methods of relief from the chances of life; educational reforms, in process, to meet the demands of a new age, and legislative remedies for the evils of social change and maladjustment; the crisis of Christianity under modern capitalized industrialism. These topics indicate the nature of the subjects studied. This course is arranged to follow Economics 7; 3 hours. Credit, 3.

Professor SPRAGUE.

HISTORY AND GOVERNMENT.

Associate Professor EYERLY, Mr. HOLCOMB.¹

Elective Courses.

1. ELEMENTS OF POLITICAL SCIENCE. — Nature and scope of political science; origin and evolution of the State; systems of government in the principal European States; organization and working of the national and of the State governments of the United States; relation of government to political parties and to public opinion; the functions of government as related to labor and commerce. Three hours. Credit, 3.

Associate Professor EYERLY.

2. LOCAL POLITICAL INSTITUTIONS. — A comparative study of the organization, functions and achievements of country and city groups, especially as these are concerned with such matters as taxation, finance, licenses, franchises, public ownership, highways, transportation and communication, water supply, fire protection, public lighting, markets, food inspection, garbage and sewage disposal, infectious diseases, housing conditions, police force, parks and playgrounds, libraries, schools, care of dependents. Three hours. Credit, 3.

Associate Professor EYERLY.

3. THE HISTORY OF NEW ENGLAND. — In this course, New England is regarded as a unit. Although the history of agriculture and of rural life is treated with special fulness, ample attention is given to political, religious and ethical history. It is hoped that the student will not only be led to an intelligent understanding of present economic conditions, but will also be imbued with a progressive loyalty to the highest ideals of the New England of the past. Lectures and required reading; 3 hours. Credit, 3.

Mr. HOLCOMB.

¹ Mr. Holcomb resigned Nov. 1, 1913.

5. THE HISTORY OF IDEALS. — This course treats history from the idealistic rather than from the economic point of view. It attempts to define the great ideals which have impelled some of the most important social, political, esthetic, scientific, ethical and religious movements of medieval and modern history, and to trace the causes of the success or failure of the movements to which these ideals have led. Christianity, including monasticism, modern Catholicism and Protestantism; medieval art and architecture; the modern scientific movement; and social and political democracy will be treated historically from this point of view. Lectures and reading; 3 hours. Credit, 3.

Mr. HOLCOMB.

LANGUAGES AND LITERATURE.

Professor MILLS.

LANGUAGES AND LITERATURE: ENGLISH, JOURNALISM AND PUBLIC SPEAKING.

Associate Professor NEAL,¹ Professor LEWIS, Assistant Professor SMITH, Mr. WATTLES, Mr. PRINCE, Miss GOESSMANN.

ENGLISH.

Required Courses.

1, 2. FRESHMAN ENGLISH. — Composition; introduction to literature. Recitations, laboratory practice and lectures; theme writing; conferences. Text-book and laboratory manual, Neal's "Thought-building in Composition." Freshmen; 4 hours. Credit, 4.

Associate Professor NEAL, Assistant Professor SMITH, Mr. WATTLES, Mr. PRINCE.

3, 4. SOPHOMORE ENGLISH. — A general reading course in English literature. Prerequisite, Courses 2 and 3 respectively; sophomores; 2 hours. Credit, 2.

Professor LEWIS and Miss GOESSMANN.

Elective Courses in English Language and Literature.

[The department does not plan to give in any one year all the elective courses here outlined, but as far as practicable to provide each instructor with at least one course in literature as a needed balance to his work in composition, at the same time providing opportunity for instructors to teach and students to study literature in its various periods and aspects.]

[7. EXPOSITORY WRITING. — The principles of exposition, with exercises in composition. Subjects will be largely found in current events and contemporary thought, and treated editorially. A foundation course in more advanced composition, primarily for juniors but open to seniors; advised for those who plan to take Course 8. Not given in 1913-14. Two hours, with a third hour at the option of the instructor. Credit, 2.

Mr. WATTLES.]

[8. EXPOSITORY WRITING. — The principles of exposition with especial reference to technical writing, including the writing of bulletins; some atten-

¹ Absent on leave during first semester.

tion also to the more popular exposition of scientific facts. Primarily for juniors but open to seniors. First offered in 1912-13. Two hours, with a third hour at the option of the instructor. Credit, 2. Mr. WATTLES.]

[9,] 10. CULTURAL READING. — Outside individual reading courses, with reports and notebooks; examinations may be given if deemed advisable. Course 9 not offered in 1913-14. Credit, 1 hour. THE DEPARTMENT.

13, 14. ENGLISH WRITERS AND THOUGHT. — Studies, laboratory problems, readings, and reports in some period of English or American literature. Three hours. Credit, 3. Assistant Professor SMITH.

15. PROSE MASTERS OF THE NINETEENTH CENTURY. — A sympathetic study of the writings of Ruskin, Carlyle, Newman, Arnold and Stevenson. Junior and senior course; 3 hours. Credit, 3. Professor LEWIS.

[16. POETS OF THE VICTORIAN AGE; BROWNING, TENNYSON AND ARNOLD. — This course will deal especially with the ethical and religious ideals of these poets as expressed in their most serious poems. Not given in 1913-14. Junior and senior course; 3 hours. Credit, 3. Professor LEWIS.]

[17,] 18. ADVANCED LITERATURE. — The courses vary from year to year. They will usually provide opportunity either for intensive study of great writers or the study of the historical development or the structure and characteristics of literary types and practice in composition. Course 17 not given in 1913-14. Three hours. Credit, 3. Associate Professor NEAL.

JOURNALISM.

[The courses in journalism emphasize rural journalism. They aim to acquaint the student with the elementary problems and theory of journalism as a profession or vocation, and to exercise him, as far as conditions permit, in the commoner aspects of journalistic work, such as news-gathering, news-writing, desk-editing and editorial writing. By rural journalism is meant the application of journalistic principles in getting and suitably presenting material adapted to the non-urban rather than to the urban or metropolitan reader, so far as their interests are distinct. This includes agricultural journalism, but is by no means confined to that. Members of the classes supply, under the head "The Bay State Ruralist," a feature page for the "Springfield Sunday Union." Members of all classes may be required to turn in copy regularly for such disposition as the instructor may determine, and must have free time for covering stories. Students wishing to proceed beyond elementary study are urged to consult with the instructor before making their election in other subjects for the junior-senior years, in order that the most helpful program of work may be arranged.]

Elective Courses.

[1. INTRODUCTION TO JOURNALISM. — The foundation conceptions and aims of journalism; practice in the simple forms of journalistic writing. Prerequisite to all other work in journalism, and valuable also to students preparing for practical farming, agricultural or general science, rural education, etc., as a vocation. [See Course 2, for 1913-14.] Two hours, with a third hour at option of the instructor. Credit, 2. Associate Professor NEAL.]

2. REPORTING. — News-gathering and news-writing. This includes the gathering and presentation of industrial and agricultural information, campus news or other stories, as may be directed. Courses 1 and 2 are the foundation courses in journalism. Students admitted to 2 who have not had 1 will be required to do extra work. In 1913-14, Course 1 will be given in semester 2 as Course 2; Course 2 not being given separately that year. Two hours, with a third hour at the option of the instructor. Credit, 2.

Associate Professor NEAL.

[3.] 4. JOURNALISTIC PRACTICE. — The gathering and preparation of material for publication. Prerequisite, Course 1 or its equivalent. Two hours, with a third hour at the option of the instructor. Credit, 2.

Associate Professor NEAL.

[5.] 6. ADVANCED JOURNALISTIC PRACTICE. — Informal; given only on application; students will be assigned work as editorial assistants or writers, or otherwise employed in some form of journalistic activity. Study of particular forms of journalistic writing, of special subjects and their journalistic presentation, of particular kinds of periodical, or of current topics may be directed, and the presentation of a thesis may be required. Hours to be arranged. Two hours. Credit, 1.

Associate Professor NEAL.

PUBLIC SPEAKING.

Required Courses.

1, 2. FRESHMAN PUBLIC SPEAKING. — Freshman public speaking is required in either the first or the second semester at the option of the instructor. The course is concerned with the actual problems which confront the man who would speak convincingly and persuasively. Some attention is given to breath control and development of speaking voice, considerable attention to pronunciation and enunciation, and a large amount of attention to the preparation and delivery of extempore speeches. Text-book, Shurter's "Extempore Speaking," supplemented by lectures and discussions. Freshmen; in semester 1 or 2 as directed; 1 hour. Credit, 1. Mr. PRINCE.

8. OCCASIONAL ORATORY. — Exercises for voice and gesture; a study of the elements of vocal expression and action; speeches on assigned topics; prescribed reading; the preparation and delivery of a formal oration or two. It is especially recommended for those who desire to enter the Flint contest. Two hours. Credit, 2.

Assistant Professor SMITH.

9. DEBATING. — Considerable time is given to the study of argumentation and brief-drawing. The class is divided into teams for the platform discussion of leading questions of the day. This course is designed to develop readiness in extempore speaking. It is recommended for those who desire to enter the inter-collegiate debates. Prerequisite, Course 3; 2 hours. Credit, 2.

Assistant Professor SMITH.

LANGUAGES AND LITERATURE: GERMAN.

Assistant Professor ASHLEY, Mr. JULIAN.

Required Courses.

1. **ELEMENTARY GERMAN.** — Grammar and composition; the reading of short stories, poems, plays, etc. Especial attention is given to oral questioning and answering in German, and to translation of English into German. Required of those presenting French for entrance who do not continue that language and have not studied German. Arranged for Freshmen; open by permission to other students; 4 hours. Credit, 4. Mr. JULIAN.

2. **ELEMENTARY GERMAN.** — As stated under Course 1. Prerequisite, Course 1.

3. **INTERMEDIATE GERMAN.** — Rapid reading of selected works from Schiller, Goethe, Lessing and others; review of grammar and dictation in German; outside readings. Required of freshmen who present German for entrance and do not take French. Freshmen; open upon arrangement to other students; 4 hours. Credit, 4. Assistant Professor ASHLEY.

3A. **INTERMEDIATE GERMAN.** — Rapid reading of prose works, such as Sudermann's "Frau Sorge," and dramas, such as "Wilhelm Tell" and "Die Journalisten." Required of sophomores who took Courses 1 and 2 as freshmen. Mr. JULIAN.

4. **INTERMEDIATE GERMAN.** — As stated under Course 3. Prerequisite, Course 3.

4A. **INTERMEDIATE GERMAN.** — As stated under Course 3A. Open to students who have completed German 3A; 3 hours. Credit, 3.

5. **ADVANCED GERMAN.** — Literary study of the classicists, — Schiller's "Wallenstein," Lessing's "Nathan der Weise," Goethe's "Iphigenia," etc.; collateral readings in German and class-room reports. Prerequisite, Course 4. Sophomores; required of those who took German 3 and 4 as freshmen; open upon arrangement to other students; 3 hours. Credit, 3.

Assistant Professor ASHLEY.

Elective Courses.

6. **ADVANCED GERMAN.** — As stated under Course 5. Sophomores; open upon arrangement to other students. Prerequisite, Course 5; 3 hours. Credit, 3. Assistant Professor ASHLEY.

7. **SCIENTIFIC GERMAN.** — Reading in German of modern magazine articles and works of a scientific nature. Different work assigned according to needs of individual students. Open to juniors who have completed Course 4A or more advanced work. Three hours. Credit, 3.

Assistant Professor ASHLEY.

8. **MODERN GERMAN.** — As stated under Course 7.

9. CONVERSATION AND COMPOSITION. — Translating connected English into German. Reproducing outside readings in German orally in class; 1 hour. Credit, 1.

10. SCIENTIFIC GERMAN. — As stated under Course 9.

11. GERMAN LITERATURE. — Advanced language and literary study. Conducted entirely in German. Lectures on German literature and history; life, customs and travel in Germany. Collateral readings, including masterpieces of different epochs, such as "Niebelungenlied," Goethe's "Faust," and one modern typical drama. Prerequisite, Course 6 or 10.

Assistant Professor ASHLEY.

12. GERMAN LITERATURE. — As stated under Course 11.

LANGUAGES AND LITERATURE: FRENCH.

Assistant Professor MACKIMMIE, Mr. HARMOUNT.

Required Courses.

1, 2. ELEMENTARY FRENCH. — The essentials of grammar are rapidly taught, and will be followed by as much reading as is possible. This course is required of freshmen presenting German for entrance who do not continue that language and have not studied French; open upon arrangement to other students. Freshmen, 4 hours. Credit, 4.

Mr. HARMOUNT.

3. INTERMEDIATE FRENCH (third year). — Training for rapid reading; the reading of a number of short stories, novels and plays; composition; reports on collateral reading from periodicals and scientific texts in the library. Required of freshmen who present two years of French for entrance and do not take German, and of sophomores who take Courses 1 and 2 as freshmen; open upon arrangement to other students; 4 hours. Credit, 4.

Assistant Professor MACKIMMIE, Mr. HARMOUNT.

4. INTERMEDIATE FRENCH. — As stated under Course 3, but not required of sophomores who take Courses 1 and 2 as freshmen. Prerequisite, Course 3.

Assistant Professor MACKIMMIE.

5. ADVANCED FRENCH (fourth year). — A reading course; Balzac's "Eugenie Grandet" and "Le Père Goriot" and other masterpieces of the nineteenth century; Brunetière's "Honoré de Balzac" and Harper's "Masters of French Literature;" readings in the library and written reports. Required of sophomores who take Courses 3 and 4 as freshmen; open upon arrangement to other students. Prerequisite, Course 4; 3 hours. Credit, 3.

Assistant Professor MACKIMMIE, Mr. HARMOUNT.

Elective Courses.

6. ADVANCED FRENCH (fourth year). — A general view of the history of French literature; Kastner and Atkins' "History of French Literature." Several plays of the great classical dramatists will be read. Individual conferences on outside reading selected by the student. Prerequisite, Course 5. Sophomores; open upon arrangement to other students; 3 hours. Credit, 3.

Assistant Professor MACKIMMIE.

7, 8. **SCIENTIFIC FRENCH.** — This course is planned to meet the requirements of the individual student and aims to equip him with exact English equivalents for the French scientific terms in his particular science. Word lists of scientific terms will be required and also weekly readings and reports from scientific works in the subject in which he is majoring. Several scientific readers will be read. Three hours. Credit, 3. Mr. HARMOUNT.

9, 10. **MODERN FRENCH LITERATURE.** — The outline is intended as a suggestion. The exact subject matter of the course will be determined when the men are enrolled. The object of this course is to give an introduction to recent movements in French literature. In the drama, readings from Augier, A. Dumas, fils, Delavigne; in the novel, from Flaubert, the de Goncourts, Zola; in criticism, from Taine, Renan, Sainte-Beuve; for the literary history of the period Lanson's "Histoire de la Littérature Française." Prerequisite, the required French. Juniors or seniors; 3 hours. Credit, 3.

Assistant Professor MACKIMMIE.

LANGUAGES AND LITERATURE: SPANISH.

Assistant Professor MACKIMMIE.

Elective Courses.

1. **ELEMENTARY SPANISH.** — Grammar, with special drill in pronunciation; reading from a simple reader. Seniors or juniors; open upon arrangement to other students; 3 hours. Credit, 3.

Assistant Professor MACKIMMIE.

2. **MODERN SPANISH AUTHORS.** — Reading from modern Spanish novel and drama. Prerequisites, Course 1. Seniors or juniors; open upon arrangement to other students; 3 hours. Credit, 3.

Assistant Professor MACKIMMIE.

LANGUAGES AND LITERATURE: MUSIC.

Assistant Professor ASHLEY.

Elective Courses.

1. **HISTORY AND INTERPRETATION OF MUSIC.** — History of music among the ancients; medieval and secular music; epoch of vocal counterpoint; development of monophony opera and oratorio; life and works of the greatest representatives of the classical school — Bach, Händel, Haydn, Gluck and Mozart. One hour. Credit, 1.

Assistant Professor ASHLEY.

2. **HISTORY AND INTERPRETATION OF MUSIC.** — A continuation of Course 1. The Romantic school; Beethoven, Schubert, Weber, Mendelssohn, Schumann, Chopin, Berlioz and Liszt; Wagner and the opera. The Modern school and Modern composers. One hour. Credit, 1.

Assistant Professor ASHLEY.

DIVISION OF RURAL SOCIAL SCIENCE.

PRESIDENT BUTTERFIELD.

AGRICULTURAL ECONOMICS.

Associate Professor CANCE, Mr. BAIRD.

Required Course.

2. AGRICULTURAL INDUSTRY AND RESOURCES. — A descriptive course dealing with agriculture as an industry and its relation to physiography, movement of population, supply of labor, commercial development, transportation, public authority and consumers' demand. The principal agricultural resources of the United States will be studied with reference to commercial importance, geographical distribution, present condition and means of increasing the value of the product and cheapening cost of production. Lectures, assigned readings, class topics and discussions. Sophomores; 3 hours. Credit, 3.

Associate Professor CANCE and Mr. BAIRD.

Elective Courses.

3. ELEMENTS OF AGRICULTURAL ECONOMICS. — This course is designed to follow the required work in the elements of economics. It deals with the economic principles underlying the welfare and prosperity of the farmer and those institutions upon which his economic success depends; the economic elements in the production and distribution of agricultural wealth; means of exchange; determination of price; problems of land tenure and land values; taxation of farm property; and the maintenance of the economic status of the farmer. Lectures, text, readings, topics and field work; 3 hours. Credit, 3.

Associate Professor CANCE.

5. HISTORICAL AND COMPARATIVE AGRICULTURE. — Recommended to students in journalism or education. A general survey of agriculture, ancient and modern: feudal and early English husbandry; the later development of English agriculture; the course of agriculture in the United States, with special emphasis on the development of agriculture in New England. An attempt will be made to measure the influence of times, peoples and countries in producing different systems of agriculture, and to ascertain the causes now working to effect agricultural changes. Lectures, readings and library work. Seniors and juniors; open to other students upon arrangement; prerequisite, Course 3 or equivalent; 3 hours. Credit, 3.

Associate Professor CANCE.

6. CO-OPERATION IN AGRICULTURE. — The course treats of the history, principles and business relations of agricultural co-operation. (1) A survey of the development, methods and economic results of farmers' organizations and great co-operative movements; (2) the business organization of agriculture abroad, and the present aspects and tendencies in the United States; (3) the principles underlying successful co-operative endeavor among farmers,

and practical working plans for co-operative associations, with particular reference to credit and purchase and the marketing of perishable products. Lectures, text, assigned readings and practical exercises; 3 hours. Credit, 3.
Associate Professor CANCE.

7. THE AGRICULTURAL MARKET. — A study of the forces and conditions which determine the prices of farm products, and the mechanism, methods and problems concerned with transporting, storing and distributing them. Supply and demand, course of prices, transportation by freight, express and trolley, terminal facilities, the middleman system, speculation in agricultural products, protective legislation, the retail market, direct sales and the like are taken up. The characteristics and possibilities of the New England market are given special attention. Lectures, readings, assigned studies and field work. Juniors and seniors; 3 hours. Credit, 3.

Associate Professor CANCE.

8. PROBLEMS IN AGRICULTURAL ECONOMICS. — An advanced course for students desirous of studying more intensively some of the economic problems affecting the farmer. Some of these are: land problems, — land tenure, size of farms, causes affecting land values, private property in land, taxation of farm property; special problems, — cost of producing farm products, farm labor in New England, immigration, shifting of the rural population. Opportunity will be given, if practicable, for field work, and students will be encouraged to pursue lines of individual interest. Seniors and juniors; open upon approval to other students; 2 or 3 hours. Credit, 2 or 3.

Associate Professor CANCE.

9. SEMINAR. — Research in agricultural economics and history: New England agriculture to 1860. Library work and reports. If desirable some other topic may be substituted. Hours to be arranged. Credit, 1.

Associate Professor CANCE.

10. SEMINAR. — As stated in Course 9.

AGRICULTURAL EDUCATION.

Professor HART, Associate Professor MORTON.

Elective Courses.

1. MEANING OF EDUCATION (PSYCHOLOGY). — A study of the development, structure and function of the nervous system with reference to the sense organs; relation of mind to the nervous system; growth and nature of mental processes; the activities of the mind in the process of learning. Text-book, lectures, discussion and collateral readings and reports; 3 hours. Credit, 3.
Professor HART.

2. VOCATIONAL EDUCATION (HISTORY AND PHILOSOPHY). — A survey of educational and social movements with reference to their vocational aspects; the growth of educational institutions as influenced by science and industry. Lectures, collateral readings, reports and a thesis on some phase of industrial education; 3 hours. Credit, 3.
Professor HART.

3. **RURAL SCHOOL PROBLEMS.** — This course is designed primarily for teachers. It consists of a study of the principles and methods of instruction, class management and the organization of subject-matter in agriculture for secondary schools; practice work in school and home gardens, instruction in elementary agriculture in grammar grades, demonstration lessons in class, and practice teaching in secondary schools where possible. One lecture period; 2 2-hour laboratory periods. Credit, 3. Professor HART.

4. Continuation of Course 3, with similar periods and credit.
Professor HART, Assistant Professor MORTON.

5. **SEMINAR IN EDUCATION.** — For students who have had Courses 1, 2 and 3, or an equivalent. Topics that may be taken up for rather exhaustive study are: rural school surveys and secondary school agriculture. Seniors and graduate students; 2 hours. Credit, 2. Professor HART.

6. **SEMINAR IN EDUCATION.** — As stated under Course 5.

NOTE. — Students who complete Courses 1, 2, 3 and 4 in this department and an approved major and minor in the following subjects may become candidates for a teachers' certificate: agriculture, biology, botany, chemistry, English, French, German, history, mathematics, physical geography, physics, physiology. See major in agricultural education for rules relating to teachers' certificates.

RURAL SOCIOLOGY.

Associate Professor EYERLY, President BUTTERFIELD, Professor HART, Mr. HOLCOMB,¹
Mr. STRAND.

Elective Courses.

1. **THE RURAL COMMUNITY.** — A broad survey of the field of rural sociology, including such topics as the movements of the rural population, the social conditions and life of rural people, the influence of rural life, the description of the various social institutions of the rural community, an analysis of the fundamental problems of rural life, and the means of developing and redirecting the life of the rural community. Lectures, readings and essays on assigned topics; 3 hours. Credit, 3.

President BUTTERFIELD and Associate Professor EYERLY.

3. **THE LITERATURE OF RURAL LIFE.** — A critical and appreciative study of writers, both in prose and poetry, who have interpreted nature from the viewpoint of the lover of country life, and those who have idealized agriculture, horticulture and other rural pursuits, together with those who have upheld as an ideal the development of a rural environment in cities; 3 hours. Credit, 3. Mr. HOLCOMB.¹

4. **RURAL LAW.** — The work of this course will cover such points as land titles, public roads, rights incident to ownership of live stock, contracts, commercial paper and distinctions between personal and real property. Text, written exercises, lectures, and class discussions; 1 hour. Credit, 1. Professor HART.

¹ Mr. Holcomb resigned Nov. 1, 1913.

8. THE SOCIAL CONDITIONS OF THE RURAL PEOPLE. — Composition of the rural population; nature, extent and causes of diseases and accidents; health agencies of control; extent and causes of delinquency and dependency; conditions of temperance, of sexual morality and family integrity; child labor; woman's work and position; relation of employer to employee; standard of living; size of family; cultural ideals; community consciousness and activity; standards of business conduct and of political ethics; 3 hours. Credit, 3.

Associate Professor EYERLY.

6. SOCIOLOGICAL ASPECTS OF CO-OPERATION AMONG FARMERS. — An historical sketch of the origin, extent and success of co-operation among farmers in the various European countries and in the United States; personal qualities and social conditions necessary to successful co-operative endeavor; the various forms of co-operative organization viewed in their industrial, intellectual and moral aspects; the influence of co-operation on the farmer's individualism, conservatism, self-help, thrift, contentment and on agrarian legislation, scientific agriculture and farm labor; the relation of co-operation to neighborhood life, to community pride and loyalty, to further associated effort, to class stability, solidarity and status; the demand of co-operation for a new type of leadership; the relation of co-operation to socialism and the competitive system; 3 hours. Credit, 3. [Not given in 1913-14.]

Associate Professor EYERLY.

2. RURAL INSTITUTIONS. — A study of the organized agencies by which rural communities carry on their various forms of associated life; particularly a study of the ways by which the domestic, economic, cultural, religious and political institutions contribute to rural betterment. Special attention given to the rural family and the rural church; 3 hours. Credit, 3.

Associate Professor EYERLY.

5. THE STATE AND THE FARMER. — A general survey of political organizations and movements among farmers in foreign countries and their influence in shaping agrarian legislation; the character, extent and results of foreign State aid to the farming class; political movements among farmers in the United States; "Granger" legislation; relation of the Department of Agriculture, State boards of agriculture, agricultural colleges and experiment stations, postal system, railway commissions, highway commissions, public health agencies, etc., to rural welfare; 3 hours. Credit, 3.

Associate Professor EYERLY.

9. THE SOCIAL PSYCHOLOGY OF RURAL LIFE. — Characteristics of the rural mind; character of hereditary and environmental influences; nature and effects of face-to-face groups; psychological effects of isolation, relative security and freedom from strain; relation of contact with nature, of control over immediate environment, of family co-operation and of neighborhood life to self-control, self-expression, sympathy, service and leadership; nature and effects of fashion, conventionality and custom; character of discussion and public opinion, and their relation to class feeling and organization; relation of individualism, conservatism and homogeneity to crowd phenomena and progressive democracy; 3 hours. Credit, 3.

Associate Professor EYERLY.

10. FARMERS' ORGANIZATIONS. — The history, purposes and achievements of the Grange, the Farmers' Union, farmers' clubs, village improvement associations, boys' clubs, etc.; the nature, scope, methods and history of local, State and national associations formed about some farm product or special farm interest, *e.g.*, dairying, horticulture, stock breeding, forestry; their influence on "better farming, better business, better living;" their influence in forming a class consciousness and in shaping legislation; need of federation; 3 hours. Credit, 3. Associate Professor EYERLY.

11. SOCIOLOGICAL ASPECTS OF CURRENT AGRICULTURAL QUESTIONS. — Government conservation policy, roads, railways, trolleys, telephones, postal service, credit facilities, taxation, pure food laws, tenancy and ownership, intensive versus extensive farming, agricultural labor; 3 hours. Credit, 3. Associate Professor EYERLY.

13. SEMINAR.

Associate Professor EYERLY.

GENERAL DEPARTMENTS.**MILITARY SCIENCE AND TACTICS.**

Captain MARTIN.

[The Department of Military Science and Tactics conducts its work in conjunction with the Department of Physical Education and Hygiene, in accordance with the following statement:—

All candidates for a degree in a four-years course must take for three years three full hours a week of physical training. This work must be under college supervision. At least two years of the work must be taken in the Department of Military Science and Tactics, in accordance with the requirements of the War Department; the rest is to be taken in the Department of Physical Education.

Under this arrangement, the practical (drill) courses in Military Science are given up to the Christmas recess and from the close of the spring recess to the end of the semester each year; the corresponding courses in Physical Education occupy the intervening time.

Under act of Congress (July 2, 1862), military instruction under a regular army officer is required in this college of all able-bodied male students. Men are excused from the exercises of this department only upon presentation of a certificate given by the college physician; minor disabilities which might bar enlistment are not considered. Students excused from military duty may be required to take equivalent work. The object of the instruction is to disseminate military knowledge in order that in emergency trained men may be found to command volunteer troops; but a further object is to give physical exercise, to teach obedience without detracting from self-respect, and to develop the bearing and courtesy that are as becoming in a citizen as in a soldier. Absences and other offences of military nature, and those of which the military instructor may take cognizance as affecting discipline, are dealt with by the commandant in accordance with the regulations of the department; but delinquencies in theoretical instruction not strictly military in their nature are dealt with in accordance with the rules of the faculty.

Cadets in the graduating class who have shown special aptitude for military service are reported to the Adjutant-General of the United States army and to the Adjutant-General of Massachusetts; in making appointments from civil life to the regular or volunteer army, preference is given to those who have been so reported. The names of the three most distinguished are published in the "Official Register of the United States Army." Assignments to the band are made by the military instructor. Practice in the band is credited in place of drill and theoretical instruction.

The required uniform is of khaki, costing about \$18. It is worn by all cadets when on military duty, and may be worn at other times. The uniforms are procured through an authorized tailor. Students upon entering college are required to deposit \$18 with the college treasurer to cover the cost of the uniform. The sale of old uniforms is prohibited, unless the consent of the military instructor be obtained.]

Required Courses.

1. FRESHMAN DRILL. — Practical instruction in infantry drill regulations through the school of the battalion in close and extended order; advance and rear guards; outposts; marches; ceremonies; guard duty. Upon the conduct and proficiency of this year depends the appointment of corporals for the ensuing year. Freshmen; first semester until Christmas recess; 3 hours. Credit, 1. Captain MARTIN.

2. FRESHMAN DRILL. — As stated under Course 1. Freshmen; second semester after spring recess; 3 hours. Credit, 1.

3. SOPHOMORE DRILL. — Practical instruction as before; pointing, aiming and sighting drills; litter drills, and first aid to the injured by detachment; target practice, in gallery and on the range. Corporals are appointed from this class. On their conduct and proficiency depends the appointment of sergeants in the next class. Sophomores; first semester until Christmas recess; 3 hours. Credit, 1. Captain MARTIN.

4. SOPHOMORE DRILL. — As stated under Course 3. Sophomores; second semester after spring recess; 3 hours. Credit, 1.

5. SOPHOMORE TACTICS. — Theoretical instruction in "Infantry Drill Regulations," to include the school of the company, "Manual of Guard Duty," "Small Arms Firing Regulations." Sophomores; 1 hour. Credit, 1.
Captain MARTIN.

6. SOPHOMORE TACTICS. — As stated under Course 5. Sophomores; 1 hour. Credit, 1.

7. JUNIOR DRILL. — Practical instruction as before, target practice, in gallery and on the range. Sergeants are appointed from this class. On their conduct and proficiency depends their selection as officers for the ensuing year. When necessary, officers will also be appointed from this class. Juniors; first semester until Christmas recess; 3 hours. Credit, 1.
Captain MARTIN.

8. JUNIOR DRILL. — As stated under Course 7. Juniors; second semester after spring recess; 3 hours. Credit, 1.

9. JUNIOR TACTICS. — Theoretical instruction in "Infantry Drill Regulations," to include the school of the battalion; advance and rear guards; outposts; marches and ceremonies; "Manual of Field Service Regulations;" preparation of reports; returns, muster-rolls, enlistment and discharge papers, rosters, requisitions, etc.; army regulations; lectures on military science. Juniors; 1 hour. Credit, 1.
Captain MARTIN.

10. JUNIOR TACTICS. — As stated under Course 9. Juniors; 1 hour. Credit, 1.

Elective Courses.

11. SENIOR DRILL. — Practical instruction as before; conduct of drills of lower classes. Officers will as a rule be selected from this class. Cadets electing Courses 11 and 12 must take the election for the year, and not later than the first Monday in June of their junior year. No cadet electing this course will after the commencement drill be permitted to change his election without the consent of the dean of the faculty and of the commandant. Seniors; first semester until Christmas recess; 3 hours. Credit, 1.

Captain MARTIN.

12. SENIOR DRILL. — As stated under Course 11. Seniors; second semester after spring recess; 3 hours. Credit, 1.

PHYSICAL EDUCATION AND HYGIENE.

Assistant Professor HICKS, Mr. GORE, Mr. FITZMAURICE.

HYGIENE.*Required Course.*

1. **HYGIENE.** — Lectures, reading, quizzes and a report on some assigned topic of personal hygiene or sanitation. Freshmen; 1 hour. Credit, 1.

Assistant Professor HICKS.

PHYSICAL EDUCATION.

[The Department of Physical Education conducts its work in physical training in conjunction with the Department of Military Science and Tactics, as explained in the note preceding the description of the courses in Military Science. All classified undergraduate students are given a physical examination upon entering.]

Required Courses.

1. **ELEMENTARY GYMNASTICS.** — Exercises, games and athletics; from January 1 to April 1, in connection with Course 2. Freshmen; 3 hours. Credit (given only for Course 2), 1. Mr. GORE and Mr. FITZMAURICE.

2. **ELEMENTARY GYMNASTICS.** — As stated under Course 1.

3. **GRADED GYMNASTICS.** — Exercises, games and athletics; from January 1 to April 1, in connection with Course 4. Sophomores; 3 hours. Credit (given only for Course 4), 1. Mr. GORE and Mr. FITZMAURICE.

4. **GRADED GYMNASTICS.** — As stated under Course 3.

5. **GYMNASTICS.** — Drills, games and athletics; from January 1 to April 1, in connection with Course 6. Juniors; 3 hours. Credit (given only for Course 6), 1. Mr. GORE and Mr. FITZMAURICE.

6. **GYMNASTICS.** — As stated under Course 5.

Elective Courses.

7. **TRAINING COURSE.** — History of Physical Education; supervision of indoor and outdoor athletic contests and games; athletic administration. Seniors; 3 hours. Credit, 1. Assistant Professor HICKS.

8. **TRAINING COURSE.** — As stated under Course 7.

THE GRADUATE SCHOOL.

THE GRADUATE SCHOOL.

KENYON L. BUTTERFIELD, A.M., LL.D., President of the College.

CHARLES E. MARSHALL, Ph.D., Director of the Graduate School and Professor of Microbiology.

Graduate courses leading to the degrees of master of science and doctor of philosophy have been given for a number of years. Demands for these courses have now greatly increased, and in recognition of the benefits to be derived from a separate organization, a distinct graduate school has been established for the purpose of fitting graduates of this and other institutions for teaching in colleges, high schools and other public schools; for positions as government, State and experiment-station agriculturists, bacteriologists, botanists, chemists, entomologists, horticulturists and zoölogists; and for numerous other positions requiring a great degree of skill and scientific knowledge.

ADMISSION.

Admission to the graduate school will be granted:—

1. To graduates of the Massachusetts Agricultural College.
2. To graduates of other institutions of good standing who have received a bachelor's degree substantially equivalent to that conferred by this college.

In case an applicant presents his diploma from an institution of good standing, but has not, as an undergraduate, taken as much of the subject he selects for his major as is required of undergraduates at the Massachusetts Agricultural College, he will be required to make up such parts of the undergraduate work in that subject as the professor in charge may consider necessary. He shall do this without credit toward his advanced degree.

Admission to the graduate school does not necessarily admit to candidacy for an advanced degree,—students holding a bachelor's degree being in some cases permitted to take graduate work without becoming candidates for higher degrees.

Applications for membership to the graduate school should be presented to the director of the school. Full statements of the applicant's previous training, of the graduate work desired, and of the amount and kind of work already done by him as an undergraduate should be submitted,—together with a statement whether the applicant desires to work for a degree.

Registration is required of all students taking graduate courses, the first registration being permitted only after the student has received an authorization card from the director.

NATURE AND METHODS OF GRADUATE WORK.

Persons taking graduate work will find this quite different in its nature from undergraduate courses. A broad knowledge of two (or three) subjects is required, and the professors in charge of these may adopt any methods

which may seem desirable to secure this to the student. Lectures, laboratory and field work in various forms are utilized; but whatever the method chosen, the aim is to train the students in methods of original investigation and experiment, inductive reasoning and the ability to carry on independent research. In addition to the lectures, a large amount of outside reading is required, the object being to give a broad knowledge of all aspects of the subjects chosen, in addition to the complete knowledge of those portions involved in or directly related to the original investigation which is to result in the thesis. Originality and ability to lead in scientific research after completing graduate work, and the establishment of a broad and thorough foundation upon which these qualities must be based, are the objects aimed at; and any methods which promise to give these results may be made use of (varying according to the nature and personal equation of each student), the supervision being largely individual rather than collective.

Candidates for the degree of master of science are required to prosecute two subjects, one of which shall be designated as the major and the other as the minor. These subjects may not be selected in the same department.

Candidates for the degree of doctor of philosophy are required to prosecute three subjects, one of which shall be designated as the major, the others as minors. No two of these subjects may be taken in the same department.

Advanced students who are not candidates for degrees may, with the approval of the faculty of the school, take more than one subject in the same department.

A statement of the subjects chosen must in each case be submitted to the director of the school for approval by the necessary committee. The chosen subjects must bear an appropriate relation to each other.

A working knowledge of French and German is essential to successful graduate work, and students not having this will find it necessary to acquire it as soon as possible after entering.

A description of the equipment of the various departments is given under "General Information."

THESES.

A thesis is required of each candidate for an advanced degree. It must be on a topic belonging to the candidate's major subject, must show that its writer possesses the ability to carry on original research, and must be an actual contribution to knowledge.

Two copies of each thesis in its final form, ready for the printer, must be submitted to the director of the school before the candidate for the degree may take the required oral examination. One of the said copies, to contain all drawings, is to be retained as an official copy by the said director, and the other by the department in which the thesis was prepared. The candidate for the doctor's degree must be prepared to defend at the oral examination the views presented in his thesis. When printed, three copies of each thesis must be deposited with the director of the graduate school and three copies with the department in which the work was carried out.

All theses become the property of the department in which they are prepared.

FINAL EXAMINATIONS.

For the degree of master of science, a final examination, which may be either written or oral, or both, is given upon the completion of each subject.

For the degree of doctor of philosophy, final examinations on the minors

taken are given upon the completion of the subjects. In the major subject, a written examination, if successfully passed, is followed by an oral examination in the presence of the faculty of the school.

DEGREES CONFERRED.

The degree of master of science is conferred upon graduate students who have met the following requirements: —

1. The devotion of at least one year and a half to the prosecution of study in two subjects of study and research, not less than one full college year of which must be in residence.

2. The devotion of twenty hours each week to the chief or major subject, and of from twelve to sixteen hours per week to the minor subject.

3. The preparation of a thesis in the major subject, constituting an actual contribution to knowledge, and accompanied by drawings if necessary.

4. The passing of final examinations, in both major and minor subjects, to the satisfaction of the professors in charge.

5. The payment of all fees and college expenses required.

The degree of doctor of philosophy is conferred upon graduate students who have met the following requirements: —

1. The devotion of at least three years to the prosecution of three subjects of study and research in residence at the college.

2. The devotion of twenty hours each week to the chief or major subject during the entire period, and of from twelve to sixteen hours per week for a year and a half to each minor subject.

3. The preparation of a thesis, in the major subject, constituting an actual contribution to knowledge, and accompanied by drawings if necessary.

4. The passing of final examinations, in both the major and minor subjects, to the satisfaction of the professors in charge.

5. The payment of all fees and college expenses required.

The fee for the degree of master of science is \$10, and for the degree of doctor of philosophy, \$25.

COURSES FOR DEGREE OF MASTER OF SCIENCE.

Available either as major or minor subjects for the degree of master of science: —

Agriculture.
Botany.
Chemistry.
Entomology.

Horticulture.
Mathematics and physics.
Veterinary science.
Zoölogy (minor only).

COURSES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

Available for a major subject for the degree of doctor of philosophy: —

Botany.
Chemistry.

Entomology.
Horticulture.

Available for a minor subject for the degree of doctor of philosophy: —

Agriculture.
Botany.
Chemistry.

Entomology.
Horticulture.
Zoölogy.

GENERAL OUTLINE OF COURSES FOR THE DOCTORATE.

Major Courses.

BOTANY. — The following subjects in botany may be studied: —

- (a) Vegetable physiology.
- (b) Vegetable pathology.
- (c) Ecology.
- (d) History of Botany.

In the graduate course in botany special attention is given to such subjects as plant physiology and pathology, ecology and the history of botany, etc. These subjects are pursued to a greater or less extent, as the previous training of the student and the nature of the original problem undertaken may determine. The object of the course is to give the student a technical training in botany to develop the spirit of research and to lay a broad foundation in the subject. (As a supplement to this course the student will do well to take, in addition to his prescribed minor work, a brief course in the history of philosophy and psychology.) Extensive reading of botanical literature, both general and specific, is required in certain subjects, and weekly lectures are given, together with occasional seminars, in which various new problems of botanical science are considered. A thesis dealing with some economic problem in plant physiology or pathology, or in both, and containing a distinct contribution to knowledge, is required.

CHEMISTRY. — The department is prepared to offer advanced courses in the following branches of chemistry, particularly as applied to agriculture: —

- (a) Inorganic chemistry.
- (b) Organic chemistry.
- (c) Physiological chemistry.
- (d) Physical chemistry.
- (e) Analytical chemistry.

Here follows a statement of courses which may be selected by any one properly qualified, and particularly by those who are desirous of doing work for advanced degrees: —

Course A. Research in industrial problems applied to agriculture.

Associate Professor PETERS.

Course B. Research in physico-agricultural chemistry. Prerequisite, Course 15 or its equivalent.

Assistant Professor ANDERSON.

Course C. Advanced analytical chemistry. Research work in connection with the study of methods of analysis of fertilizers, cattle feeds, dairy products, soils, insecticides and sugars. Recent and original methods will be applied to a study of the composition of agricultural products.

Professor WELLINGTON or Associate Professor PETERS.

Course D. Advanced organic chemistry. Special topics in advanced organic chemistry will be considered, both by lectures and in the laboratory. These will include such subjects as constitution and properties of carbohydrates, proteins and fats, uric acid and related compounds, and alkaloids;

also such purely chemical phenomena as isomerism, tautomerism and optical rotation. The reading will include "The Monographs on Biochemistry," Cohen, Schorlemmer and Lachman.

Professor CHAMBERLAIN.

Course E. Advanced topics in physiological agricultural chemistry will be studied especially in the laboratory, including digestion, metabolism and nutrition, dietetics, feeding rations, enzymatic action and isolation of enzymes. Required reading will be followed in Abderhalden, Lusk, Hammersten, Stiles, Armsby and Euhler.

Professor CHAMBERLAIN.

Students for the advanced degrees of master of science and doctor of philosophy will be given a special outline of work, and will also be assigned a subject for an original thesis by the professor in charge of the work, all of which must be completed to the satisfaction of the chemical staff and particularly of the professor under whom the work is done. Students not working for a degree may take special work along agricultural chemical lines. Information may be obtained by consulting the chemical staff.

ENTOMOLOGY. — I. For the degree of doctor of philosophy as a major: Some knowledge of all the divisions of this subject is essential for the professional entomologist, though a large part of his time will be devoted only to certain portions. To insure some familiarity with all these divisions, lectures, laboratory work, field training or required reading are given in each of the following topics: —

(a) *Morphology.* — Embryology; life history and transformations; histology; phylogeny and the relation of insects to other arthropods; hermaphroditism; hybrids; parthenogenesis; pedogenesis; heterogeny; chemistry of colors of insects; luminosity; deformities of insects; variation; duration of life.

(b) *Ecology.* — Dimorphism; polymorphism; warning coloration; mimicry; insect architecture; fertilization of plants by insects; instincts of insects; insect products of value to man; geographical distribution in the different faunal regions; methods of distribution; insect migration; geological history of insects; insects as disseminators of disease; enemies of insects, vegetable and animal, including parasites.

(c) *Economic Entomology.* — General principles; insecticides; apparatus; special cases; photographs of insects and their work; methods of drawing for illustrations; field work on insects and study of life histories; legislation concerning insects.

(d) *Systematic Entomology.* — History of entomology, including classifications and the principles of classification; laws governing nomenclature; literature, how to find and use it; indexing literature; number of insects in collections and in existence (estimated); lives of prominent entomologists; methods of collecting, preparing, preserving and shipping insects; important collections of insects.

(e) *Seminar.* — A monthly meeting of graduates, at which reports on current literature are presented and various entomological topics of importance are discussed.

(f) *Required Readings.* — The best article on the various topics named above and on the different orders of insects, to cover from fifteen thousand to

twenty thousand pages of English, French and German, the candidate to be examined at the close of his course on this with his other work.

(g) *Thesis*. — A thesis, illustrated with drawings, consisting of the results of original investigation upon one or several topics, and constituting a distinct contribution to knowledge, must be completed before the final examinations are taken.

II. For the degree of doctor of philosophy as a minor, and for the degree of master of science either as a major or minor: Such portions of the course outlined above as seem most appropriate to their other subjects are given to students taking entomology as a minor.

HORTICULTURE. — Graduate work is offered in various lines of horticulture. For the most part this is divided into the different departments which now constitute the college Division of Horticulture, and which are as follows: Pomology, Floriculture, Landscape Gardening, Forestry and Market Gardening. For work in these lines application should be made direct to the heads of the several departments.

Besides this work, however, opportunity is offered for graduate study in General Horticulture, including topics from the several organized departments mentioned, and also questions relating to plant breeding, general evolution, propagation, manufacture of horticultural products, etc. This general work is under the direction of Prof. F. A. Waugh, head of the Division of Horticulture.

ZOOLOGY. — Courses in zoölogy are available as a minor for the degree of master of science, and as a minor for the degree of doctor of philosophy. The nature of the work varies according to circumstances, and may be intensive in a special field, or of a somewhat more general character, depending on the student's previous acquaintance with general zoölogical science.

The time devoted to zoölogy as a minor for either of the above-named degrees may vary from 12 to 16 hours per week, pursued for a year and a half.

NOTES.

1. The graduate staff reserves the privilege of recommending and allowing courses in other institutions as a part of residence instruction. Such supervision will be exercised by the graduate staff and credit granted as are essential to the highest standards of efficiency.

2. All time statements refer to the minimum time recognized. It will be readily understood that diligence, seriousness of purpose, capacity, proficiency, and effectiveness cannot be measured by a definite number of hours.

3. A course may be outlined for a student by any department, subject to the approval of the graduate staff. The courses offered above, however, constitute the established courses at present.

THE SHORT COURSES
AND
THE EXTENSION SERVICE.

THE SHORT COURSES AND THE EXTENSION SERVICE.

THE EXTENSION SERVICE.

Through its Extension Service, the Massachusetts Agricultural College attempts to make every department of the institution a contributing factor toward developing the agriculture and country life of the Commonwealth. The work of the Extension Service divides itself quite naturally into the Short Courses given at the college and the various activities of an educational nature which are carried on all over the State.

Under the usual definition of extension activities, Short Courses are not strictly extension projects. They are rather a part of the academic work of the institution. For the sake of administrative efficiency it has seemed best to place them in charge of the director of the Extension Service in so far as organization and direction are necessary. An effort is made through these courses to bring to the college, for a few days or a few weeks, as many people as can possibly be reached in this way. In the main, the instruction in the Short Courses is given by the regular teaching force of the college, the same laboratories and equipment being used for this work as in the regular college work.

The Extension Service proper comprises various methods for the dissemination of agricultural information to the people of the Commonwealth who are interested in agriculture and country life, but who cannot come to the college for even a short time. The object of the Extension Service is to make the college as useful to the people of the Commonwealth as possible.

SHORT COURSES GIVEN AT THE COLLEGE.

- A. Winter School.
 - 1. Ten Weeks' Courses.
 - 2. Apple Packing School.
 - 3. Farmers' Week.
 - 4. Beekeepers' Course and Convention.
- B. Summer School.
 - 1. Summer School of Agriculture and Country Life.
 - 2. School of Rural Social Service.
 - 3. Conference on Rural Community Planning.
 - 4. Boys' Agricultural Camp.
 - 5. Poultry Convention.
- C. Miscellaneous Short Courses.
 - 1. The School for Tree Wardens.
 - 2. Short Courses for Other Groups.
 - 3. Special Days for Foreigners.
 - 4. Meetings of Organizations at the College.

EXPENSES OF THE SHORT COURSES. — The expense of attending any of the Short Courses is approximately as follows: —

Registration fee (Ten Weeks' Course, Apple Packing School, Summer School), . . .	\$5
Furnished rooms in private houses (per week),	\$1.50-\$3
Board at college dining hall, per week,	\$4
Board with private families, per week,	\$5-\$6

A lunch counter is operated in connection with the college dining hall. Meals may be obtained there *à la carte* at very reasonable prices.

Students in each of the dairy courses must provide themselves with two white wash suits and a white cap for use in the practical dairy work. The cost in Amherst is about \$1.25 for suit and cap.

REQUIREMENTS FOR ADMISSION TO SHORT COURSES.—No entrance examinations are required, but students are advised to review their school work in English and arithmetic. Practical experience in farm, garden, orchard or greenhouse work is an advantage. The courses are open to both men and women.

Students must be at least eighteen years of age and must furnish satisfactory evidence of good moral character. References are required and these are investigated before applicants are accepted.

A. WINTER SCHOOL, 1914.

1. **OUTLINE OF THE TEN WEEKS' COURSES (JANUARY 6 TO MARCH 13, INCLUSIVE).**—The following courses are to be given:—

1. Soil Fertility. Associate Professor HASKELL. Three lectures a week for ten weeks.
2. Field Crops. Mr. E. M. McDONALD, Instructor in Agronomy. Three lectures a week for ten weeks.
3. Types and Breeds of Live Stock. Associate Professor McLEAN. Three lectures and two two-hour judging periods a week for ten weeks.
4. Live Stock Feeding. (Instructor to be announced.) Three lectures a week for ten weeks.
5. Live Stock Management. Mr. E. L. QUAIPE, Instructor in Animal Husbandry. One two-hour laboratory period each week.
6. Animal Breeding. Associate Professor McLEAN. One lecture and one two-hour laboratory period each week.
7. Dairying. Professor LOCKWOOD, Mr. COONS and assistants. Five one-hour and two two-hour periods and two three-hour periods each week.
8. Dairy Bacteriology. Professor MARSHALL. Two lectures each week.
9. Animal Diseases and Stable Sanitation. Professor PAIGE. Two lectures each week.
10. Poultry. Professor GRAHAM. Five lectures each week.
11. Fruit Growing. Professor SEARS. Five lectures each week.
12. Market Gardening. Mr. B. C. GEORGIA, Instructor in Market Gardening. Three lectures each week.
13. Landscape Gardening. Assistant Professor HARRISON. Two two-hour exercises each week.
14. Floriculture. Mr. E. J. CANNING, Temporary Instructor. Five lectures and one field trip each week.
15. Forestry. Professor CLARK. One lecture each week.
16. Botany. Mr. F. A. McLAUGHLIN, Assistant in Botany. Two lectures each week.
17. Entomology. Professor FERNALD. Three lectures each week.
18. New England Rural Life. Two lectures each week.
19. Farm Accounts. Professor FOORD. One two-hour exercise each week.
20. Mechanics. Professor LOCKWOOD and Mr. SCHROYER. One two-hour exercise each week.
21. Rural Sanitary Science. Professor MARSHALL. Two lectures each week.
22. Beekeeping. Assistant Professor GATES and Mr. BYARD. Three lectures and one laboratory period each week.
23. Rural Improvement. Professor WAUGH. Two lectures each week.
24. Marketing Farm Products. Associate Professor CANCE. One lecture each week.

2. **APPLE PACKING SCHOOL.**—The work of this school, which is conducted by the department of pomology, is of a practical nature and includes both box and barrel packing. Persons taking the course will become familiar with the various types of packs and will receive sufficient practice to enable them to do good commercial packing.

The work in packing is supplemented by lectures on phases of commercial orcharding, such as planting, varieties, spraying, pruning, harvesting and marketing.

A fee of \$5 to help pay for fruit and other materials used is charged for this course.

3. FARMERS' WEEK. — In order to reach those who cannot come to the college for a longer time, this very practical course, four days in length, is given each year. The regular college equipment is used, and work of the regular faculty is supplemented by lectures and demonstrations by eminent men.

The work is divided into four sections: (1) General agriculture and farm management; (2) dairying, animal husbandry and poultry; (3) horticulture, including fruit growing, market gardening, floriculture and forestry; (4) women's section, including home economics, household management and so forth.

These sections take up the time from early morning until late afternoon. Prominent men are engaged for the evening lectures. Fruit, corn, dairy and poultry shows and other exhibits are among the leading features. No fee is charged. The date of the 1914 Farmers' Week is March 16 to March 20, inclusive.

4. BEEKEEPERS' COURSE. — In the last few years a complete apiary and equipment has been brought together at the college, under the direction and management of Dr. Burton N. Gates. This equipment furnishes the best of facilities for the teaching of beekeeping and allied subjects. A conference of beekeepers, with extensive exhibits of beekeepers' supplies and apparatus, is held annually at the close of each short course.

The courses offered are: —

1. Practical Phases of Beekeeping. Assistant Professor GATES.
2. Crops for Honey Bees. Dr. BROOKS.
3. Relation of Bees to the Pollination of Plants. Professor STONE.
4. Origin and Evolution of the Honey Bee. Professor FERNALD.
5. Bees and Beekeepers' Supplies. Professor PAIGE.

The features of the convention are lectures, demonstrations by authorities of national reputation, as well as exhibits of inventors, manufacturers, supply merchants and queen rearers. A special invitation is extended to all beekeepers to display and demonstrate inventions, implements or methods. If table space is desired or special equipment is to be prepared, notice should be sent to Dr. Burton N. Gates, Amherst, Mass., at least two or three weeks before the convention. The college provides covered tables for the exhibits.

B. SUMMER-SCHOOLS.

1. THE SUMMER SCHOOL OF AGRICULTURE AND COUNTRY LIFE. — The Summer School of the Massachusetts Agricultural College will open June 30, 1914, for a term of five weeks. This will be the sixth session of this summer school, those of previous years having been highly successful. The experience of these five years will aid in making material improvements in the session of 1914.

The work of the summer school was designed originally for school-teachers, and the attendance has been largely of that class. Special attention will be

given to the needs of teachers again this year. It has been found, however, that there are many persons who seek a general knowledge of theoretical and practical agriculture, and who can come to the college conveniently during the summer season. Extended courses will be offered for the benefit of such persons also.

The formal instruction in the summer school is given in definite courses herein described. From these each pupil may elect courses of not less than 10 nor more than 15 exercises a week, unless a larger or smaller amount of work is allowed by the director. These courses include a large amount of field work, observation trips, outdoor exercises and laboratory experiments.

Besides these, general field exercises will be arranged for one afternoon of each week. These will be on topics of interest to all. Excursions will be arranged for every Wednesday afternoon, and more extended excursions for the whole school will be planned for every Saturday. The excursions will be in charge of an instructor as heretofore. In the past they have proved a very enjoyable feature of the work.

Round table and special discussions will be arranged by various instructors as their courses require. A conference of rural social workers and educators of New England will be held July 2 to July 31. An outline of the conference will be found in another part of this bulletin.

A course of evening lectures on popular topics relating to the work of the school will be a feature of the general program. Several able lecturers have already been engaged for this course. Like everything else connected with the summer school, this lecture course is entirely free to all students.

Those who expect to attend should register as early as possible. *Registration fee for the summer school is \$5, payable at the time application is made. Registration fee for clergymen attending the courses and conferences given especially for them is \$1. No other tuition is charged.* These fees should accompany application blanks and should be made payable to the director of the summer school or the college treasurer.

A bulletin describing the Summer School is issued in March each year.

Faculty and Courses. — The faculty and courses given in the 1913 School were as follows: —

KENYON L. BUTTERFIELD, LL.D. President of the College. Head of the Division of Rural Social Science.

WILLIAM D. HURD, M.Agr. Director of the Extension Service.

MARION S. BORDEN, B.S. Assistant in Home Economics.

ROBERT H. BOGUE, B.Sc. Assistant in Chemistry.

JOSEPH CHAMBERLAIN, Ph.D. Associate Professor of Organic and Agricultural Chemistry.

WILLIAM D. CLARK, M.F. Professor of Forestry.

LAURA COMSTOCK. Extension Professor of Home Economics.

SAMUEL COONS. Instructor in Buttermaking.

GUY C. CRAMPTON, Ph.D. Associate Professor of Entomology.

BURTON N. GATES, Ph.D. Assistant Professor of Beekeeping.

B. C. GEORGIA, B.Sc. Instructor in Market Gardening.

HAROLD M. GORE, B. Sc. Assistant in Boys' Camp.

JOHN C. GRAHAM, B.Sc. Agr. Associate Professor of Poultry Husbandry.

CHARLES R. GREEN, B.Agr. Librarian.

F. JOSEPHINE HALL, A.M. Adviser for Women, Waltham, Mass.

WILLIAM R. HART, A.M. Professor of Agricultural Education.

SIDNEY B. HASKELL, B.Sc. Associate Professor of Agronomy.

CURRY S. HICKS, B.Sc. Assistant Professor of Physical Education and Hygiene.

GEORGE S. HOLCOMB, A.B., S.T.B. Lecturer in History.

WILLIAM P. B. LOCKWOOD, B.Sc. Agr. Associate Professor of Dairying.

FREDERICK A. McLAUGHLIN, B.Sc. Assistant in Botany.

JOHN A. McLEAN, B.Sc. Agr. Associate Professor of Animal Husbandry.

C. J. MAYNARD. Author and Lecturer on Bird Life, West Newton, Mass.

ORION A. MORTON. Extension Professor of Agricultural Education.

E. L. MORGAN, A.M. Community Field Agent.

A. VINCENT OSMUN, M.Sc. Assistant Professor of Botany.

CHARLES A. PETERS, Ph.D. Associate Professor of Inorganic and Soil Chemistry.

LAURA POST. Assistant in Physical Education, Wellesley College, Wellesley, Mass.

EDWARD TALLMADGE ROOT. Secretary of the Federation of Churches of Massachusetts and Rhode Island, Boston.

FREDERICK W. RIED. Director of Practical Arts, State Normal and Training Schools, Framingham, Mass.

JOHN A. SCHEUERLE. Formerly Pastor of County Church, Hartford, Vt.

FRED C. SEARS, M.Sc. Professor of Pomology.

ROBERT J. SPRAGUE, Ph.D. Head of Division of the Humanities and Professor of Economics and Sociology.

GEORGE E. STONE, Ph.D. Professor of Botany.

FRANK A. WAUGH, M.Sc. Head of Division of Horticulture and Professor of Landscape Gardening.

EDWARD A. WHITE, B.S. Professor of Floriculture.

2. THE SCHOOL OF RURAL SOCIAL SERVICE. — For the sixth season the Massachusetts Agricultural College offers a School of Rural Social Service, in connection with the usual Summer School of Agriculture and Country Life.

The social service spirit is abroad all over this country, and men are turning their attention to these subjects as never before. The courses offered this summer will give instruction, furnish information and direct the attention of those interested more particularly, to the rural field, which has as yet received little systematic study when compared with that which has been given city conditions.

This year more of a feature will be made of the group of courses given especially for those who might be classed as Rural Social Workers. These courses are intended for clergymen, teachers, librarians, town officers, grange workers and others who devote a considerable portion of their time to problems of community development. Courses 30 to 36, inclusive, as given in the summer school, are designed for the needs of these persons. All other courses given during this period are also open to those who register.

From all of these courses a group of studies can be arranged which will present the rural problem from several standpoints, and will serve to show the relationships of the workers in the different lines to their respective fields and to the larger community problems which are constantly being presented to them.

3. THE CONFERENCE ON RURAL COMMUNITY PLANNING. — This conference is held as a closing feature of the summer school each year. In it the larger problems of New England community development are freely discussed. The following organizations co-operate with the college in providing the programs: the Massachusetts Federation of Churches, the State Board of Education, the Free Public Library Commission, the Massachusetts Civic League, the State Board of Health, the County Work of the Y. M. C. A., the New England Home Economics Association and the Bureau of Statistics.

Section meetings of these groups are held each forenoon, a general round-table discussion is held each afternoon, and lectures are delivered each evening by persons prominent in social and educational work. Many small group conferences are also arranged.

Extensive exhibits showing in a graphic way what organizations and com-

munities are doing along welfare lines are arranged at the time of the conference.

The conference usually lasts four days, coming the last of July and first of August. A full program is published about June 1. There are no registration or other fees.

4. **BOYS' AGRICULTURAL CAMP.** — This camp is arranged in order that boys from rural districts and small towns may receive some instruction in agriculture and clean, wholesome sports, and that they may have impressed upon them their responsibilities as coming members of society. The daily program consists of camp duty, flag raising, agricultural lessons, talks on hygiene, good citizenship, and so forth, play and recreation, instruction in handicrafts, photography, evening camp fires and lectures by men prominent in boys' work. A small fee is charged to help defray the cost of maintaining the camp.

5. **POULTRY CONVENTION.** — In order to give a large number of poultrymen, who cannot come to the college for a longer time, practical instruction in modern methods of breeding, feeding, poultry-house construction, operation of incubators and brooders, selecting and judging poultry for utility and for show, marketing poultry products, and so forth, — a convention lasting nearly a week is held each summer. The date of the 1914 meeting is from July 22 to July 24, inclusive.

C. MISCELLANEOUS SHORT COURSES.

1. **THE SCHOOL FOR TREE WARDENS.** — This course is given in co-operation with the State Forester and the Massachusetts Forestry Association, to give tree wardens and city foresters instruction in the planting, care and preservation of trees, forestry practices, spraying, pruning, civic improvement, duties of tree wardens, and so forth. The 1914 school will be held from March 24 to 27, inclusive. No registration fees are charged. The cost of room and board is low.

2. **SHORT COURSES FOR OTHER GROUPS.** — Plans are now under way to provide short courses at Amherst, lasting four or five days, for fertilizer agents, feed agents and dealers, milk inspectors, seed dealers and any other groups that may desire such instruction. Information concerning these may be obtained by writing the Extension Service.

3. **SPECIAL DAYS FOR FOREIGNERS.** — Each year there are provided at the college special days for foreigners, especially the Polish farmers who have come into the Connecticut valley in large numbers. Instruction is given in the crops and animals in which these people are most interested, soil management, co-operation, the need of their becoming good American citizens, Polish history, and so forth. Similar work will gladly be arranged at the college, or in different sections of the State, for other nationalities.

4. **MEETINGS OF ORGANIZATIONS AT THE COLLEGE.** — It is customary for the various State organizations of fruit growers, poultrymen, breeders' associations, and so forth, to meet for conventions and picnics at the college. Such meetings are welcomed by the college authorities, and organizations are cordially invited to meet at the college. The Extension Service will provide facilities for seeing the college grounds, and help arrange programs and other forms of entertainment.

ITINERANT INSTRUCTION ARRANGED AT THE COLLEGE BUT GIVEN THROUGH-
OUT THE STATE.

1. CORRESPONDENCE COURSES. — The correspondence courses are offered by the college in response to calls from all sections of the State from people who desire agricultural information, but who cannot come to the college for it. The courses are designed to meet the needs of farmers, dairymen, stock breeders, fruit growers, market gardeners, floriculturists and teachers in elementary schools, high schools, academies or normal schools.

Since agricultural science and practice are changing so rapidly, it is the purpose to give a summary of the latest information on the subjects treated, yet in such language that any who pursue the study can readily understand the work. Additional courses, covering other subjects, will be added from year to year.

Method of Conducting Correspondence Work. — While a large number of books have been written on various agricultural subjects, very few of them are especially adapted to the correspondence course work. For this reason the courses are conducted principally by specially prepared lessons. The subject-matter partakes somewhat of the lectures that are given in the college classes. It is recommended that the student purchase whenever possible one or two books to read along with the course. Other books are recommended for collateral reading and these can be obtained oftentimes from the local libraries.

The courses are especially recommended to the Y. M. C. A. and to granges and other farmers' clubs for study. It is to be hoped grange lecturers, club secretaries and other interested persons will organize study classes. If the size of the class or the interest which the members take in the subject is sufficient, a representative of the college is sent to the class from time to time to discuss the work and offer suggestions. Below are the courses being given in 1914: —

1. Soils and Soil Fertility. Associate Professor HASKELL.
2. Manures, Fertilizers and Soil Amendments. Associate Professor HASKELL.
3. Field Crops. Associate Professor HASKELL.
4. Farm Dairying. Professor LOCKWOOD.
5. Fruit Growing. Professor SEARS and Mr. REES.
6. Market Gardening. Conducted by Mr. B. C. GEORGIA.
7. Animal Feeding. Mr. STORY.
8. Floriculture. Conducted by Mr. CANNING.
9. Farm Accounts. Professor FOORD.
10. Entomology. Professor FERNALD.
11. Pedagogy of Agriculture. Professor HART.
12. Beekeeping. Assistant Professor GATES.
13. Forestry. Professor CLARK.
14. Shade Tree Management. Professor STONE.
15. Gardening and Elementary Agriculture. Professor MORTON.
17. Poultry Husbandry. Professor GRAHAM.

Enrollment for Correspondence Courses. — Students may enroll in the courses any time between October 1 and June 1 of the following year. It has been found advisable not to continue the courses through the summer because the farmers as well as the other students are so busy that they cannot spend the necessary amount of time upon the lessons during the summer months.

Expenses of the Correspondence Courses. — In order that none may enroll but those who are interested and desire to pursue earnest study, a small fee is

charged. This has been fixed at the rate of \$1 for each course except Courses 8 and 17, where it is necessary to charge \$1 for each of the parts. The fee is payable strictly in advance, at the time the enrollment card is sent, and the first lesson of the course is not sent until the fee is paid.

2. LECTURES AND DEMONSTRATIONS. — The members of the faculty of the college are glad to give lectures and demonstrations before granges, men's clubs, women's clubs, Y. M. C. A.'s, farmers' clubs, boards of trade and other organizations. A list of more than 40 lecturers and 200 subjects on various phases of agriculture, country life, economics, sociology, education, civic betterment and various scientific subjects has been prepared. Full courses of lectures or single lectures may be arranged.

Organizations arranging the lectures are asked to pay traveling expenses of the lecturer, provided no admission to the lecture is charged. If admission is charged, then the lecturer is entitled to a fee in addition to traveling expenses.

3. EXTENSION SCHOOLS. — Probably the most valuable work done away from the college is in the "Extension Schools." The college sends a corps of instructors to a town for a five-day school of instruction. At present, the following courses are offered: soil fertility, animal husbandry and dairying, fruit growing, poultry and home economics.

It is also possible to arrange special Extension Schools along one line of work, such as fruit growing or any other subject in which the college has facilities for giving the work.

Communities desiring an Extension School make a written request for the same, agreeing to defray all local expenses, such as the rent, heating and lighting of a suitable hall, and the board of the instructors during the school.

4. EDUCATIONAL EXHIBITS AT FAIRS AND OTHER SHOWS. — The college co-operates with the managers of fairs, industrial expositions, corn shows, poultry shows, fruit shows and other exhibitions by making educational exhibits.

For outside work a large tent has been provided. In this about thirty cabinets containing educational material are arranged in an attractive way. Accompanying the exhibit is a corps of lecturers and demonstrators who give practical instruction daily.

For inside work a space at least 40 by 60 feet is required for this exhibit.

Smaller exhibits along special lines are sent to corn, fruit and poultry shows, child welfare exhibits, milk shows and so forth.

The managers of fairs and exhibits are asked to help defray the expenses of putting on these exhibits.

5. EDUCATIONAL TRAINS. — The college, through the Extension Service, is glad to co-operate with railroad and trolley lines in the operation of educational trains and cars. The railroad usually furnishes the means of transportation, and looks after the operation of the train or cars. The college furnishes the exhibit and provides the lectures and demonstrations.

EXTENSION WORK CONDUCTED IN DIFFERENT PARTS OF THE STATE.

1. EXTENSION WORK IN FRUIT GROWING. — This work includes lectures and demonstrations on laying out and planting orchards, pruning, spraying, thinning, grading, packing and marketing fruits. Demonstration orchards, new and renovation plots, are being established all over the State, co-operatively between the college and the owners of land. Extension Schools of fruit growing and fruit grading and packing are arranged on request. Visits to

farms for advisory work are made so far as possible, and correspondence on orcharding subjects is invited.

2. **EXTENSION WORK IN DAIRYING AND ANIMAL HUSBANDRY.** — This work includes lectures and demonstrations on subjects pertaining to milk production, handling and marketing butter, and cheese making, instruction in barn planning, helps on swine and sheep raising. Assistance in organizing dairy improvement associations and breeders' associations is given; stock-judging contests for boys are arranged at the leading fairs; city milk inspectors may receive instruction for their work in feeding, scoring stables and so forth. Communities desiring to have campaigns conducted which seek to educate producers, dealers and consumers as to the production of clean, safe milk may make arrangements for these.

3. **EXTENSION WORK IN POULTRY HUSBANDRY.** — Besides conferences at the college and visits to the plants of poultrymen, giving advice on general poultry management, diseases, mating, laying out and planning buildings, and so forth, this work includes co-operative work with State institutions, county schools of agriculture, agricultural departments in high schools, manual training departments in public and normal schools and exhibits of poultry appliances at fairs and shows.

4. **EXTENSION WORK IN FARM MANAGEMENT, FIELD STUDIES AND DEMONSTRATIONS.** — This work is carried on co-operatively between the college and the office of farm management of the United States Department of Agriculture at Washington, and consists in studying farm conditions and farm management problems; in instruction in keeping farm accounts, growing field crops; in the use of fertilizer and lime; in giving advice as to farm equipment, buildings, and so forth.

5. **EXTENSION WORK IN CIVIC BETTERMENT.** — This work is carried on in connection with the department of landscape gardening at the college. Assistance is given in all kinds of rural and village improvement enterprises, such as the planting and care of shade and street trees, the planning of playgrounds, school grounds, cemeteries, picnic grounds, the beautifying of water fronts, the rearrangement and development of town commons, reservations of historic interest, and so forth. The co-operation of local granges, men's and women's clubs, village improvement societies and similar organizations is desired.

6. **EXTENSION WORK IN AGRICULTURAL EDUCATION.** — The extension work of this department is devoted to the promotion of agriculture and practical arts relating to country life in the public schools of the State. This is done by means of conferences with school officials and school patrons, the promotion of agricultural clubs among the school children and the giving of lectures before granges, farmers' clubs, and other organizations interested in this line of endeavor. The work of the agricultural clubs is under the local management of the superintendent of schools or of some one recommended by him. Each town is expected to hold an exhibit of products. Exhibits covering rather extensive districts are incorporated with the various agricultural fairs in the State. In this way the promotion of elementary instruction in agriculture is carried on by the combined efforts of the public schools, of the patrons of the schools through their agricultural fairs, and of the Agricultural College.

7. **EXTENSION WORK IN HOME ECONOMICS.** — The home economics department stands ready to assist in solving problems relative to the household in the same manner as other departments of the Extension Service do the problems of the farm. The work includes lectures and demonstrations,

assistance in forming girls' clubs and home economics clubs for women, and co-operation with any existing organization in the matter of interesting young people in the proper care of the home.

8. **EXTENSION WORK IN COMMUNITY SERVICE.** — Several communities in the State have appealed to the college for help and advice as to how all the organizations in the community can be brought to a higher state of efficiency, and as to what steps the communities themselves might take toward community development and advancement. The college is now prepared to make scientific studies of communities which lead up, by means of surveys, to the definite organization of committees to study the agricultural, educational, religious, transportation, recreation and civic needs of the communities. Usually several State organizations and some national organizations are brought in to help in working out these plans. Conferences on community affairs are organized and held when requested. The college acts simply in an advisory capacity, the communities themselves doing the actual organizing work.

9. **DEMONSTRATION AUTO TRUCK.** — In order to reach all communities of the State more effectively, a demonstration auto truck has been procured. This truck is equipped with spraying apparatus, pruning tools, Babcock milk tester and other dairy apparatus, dairy record blanks, farm account blanks, a radiopticon with sets of pictures for illustrative use, books, bulletins, pamphlets and other equipment. This outfit, in charge of a competent instructor or demonstrator, visits towns and farms of the State upon request, and gives lectures and demonstrations along the lines most interesting to the community.

10. **LIBRARY EXTENSION WORK.** — This work consists principally of sending out to the public libraries of the State collections of books and bulletins on agriculture and related subjects. General collections of 10 to 30 books and bulletins are loaned to libraries, also special collections of smaller size on specified subjects, such as fruit growing, dairying, poultry, bees, home economics, etc. These books may be kept for a period of from four to eight weeks, according to the demand for them. The only expense is cost of transportation of the books both ways. The college library also supplies information about books on agriculture and related subjects upon request.

11. **AGRICULTURAL SURVEYS.** — In order to acquire definite information about existing conditions in rural communities, which may be later used as a basis for further extension work, agricultural surveys are being made as rapidly as possible. The different organizations and officials in the community, such as the town officers, superintendent of schools and teachers, clergymen, librarians and others usually co-operate in making the survey. The survey covers every side of the community life including soil survey, farm management practices, and the educational, social, religious and recreational life. Carefully prepared blanks have been provided on which the inventory is made.

12. **AGRICULTURAL CO-OPERATION AND MARKETING.** — This department, which is just being started at the college, has for its object the establishment of agriculture on a better business basis. Assistance can be given in the organization of co-operative buying and selling associations, rural credit, the finding of a better market for agricultural produce and other lines of agricultural co-operation.

13. **MASSACHUSETTS AGRICULTURAL COLLEGE AGRICULTURAL IMPROVEMENT ASSOCIATION.** — This is an organization of ex-students of the college

who are farming in the State and who have banded themselves together for the purpose, according to the constitution of the association, of "promoting the agricultural development of the State by carrying on experiments and demonstrations for the betterment of rural pursuits, by using and encouraging the use of better seeds and animals, by the organization of co-operative societies, by the dissemination of literature bearing on recent agricultural investigations," and so forth.

High-grade strains of corn and potatoes are being produced by the members for the Massachusetts seed trade. The growing of alfalfa is now being taken up. Work with animals will soon begin.

14. **DEMONSTRATION FARMS AND PLOTS.** — Believing that one of the most effective ways of teaching modern farm practice is by the establishment of demonstrations (not experiments) in all sections of the State, thus showing a man on his own land and under his own conditions the result of proper farm practices, the college is placing demonstration plots throughout the State, showing proper fertilization of grass land and other crops, results of rotations, proper care of orchards and dairy management. For more than three years the Faunce demonstration farm has been under the advisory direction of the college. This farm has proved to the Cape Cod region that small fruits, poultry and vegetables can be successfully grown there. The management of demonstration farms is usually carried on by a committee or board of trustees representing the farm and a committee appointed from the college acting jointly.

15. **COUNTY OR DISTRICT AGRICULTURAL ADVISERS.** — As rapidly as State and government funds are available, men trained in agriculture are being assigned to counties and districts of the State to act as agricultural advisers. Residents of the county or district may, without cost, call upon the adviser for help upon any agricultural subject. The work is being developed through the co-operation of the United States Department of Agriculture, the college and the community engaging the adviser.

16. **STUDENT EXTENSION WORK.** — The social service secretary of the college, in co-operation with the Extension Service, is developing this work.

Students of the college, so far as their time will permit, will give lectures and demonstrations on agricultural subjects, teach English and civics to foreigners, coach and supervise athletic contests with boys and girls, help organize and conduct debating societies and Bible classes, give talks on true sportsmanship and clean living, give musical entertainments and act as judges and helpers at fairs and other exhibits.

17. **ADVISORY WORK WITH INSTITUTIONS AND INDIVIDUALS.** — Special effort is made to comply with as many of the requests of State institutions and individuals who ask for advice on farm problems as possible. The force of instructors available for this work is not at present sufficient, and it is hoped a competent man will be engaged in the near future for this work.

18. **PUBLICATIONS OF THE EXTENSION SERVICE.** — Beside the regular circulars and bulletins which announce the various short courses and lines of work mentioned, a monthly pamphlet, "Facts for Farmers," giving timely information on agricultural subjects, is issued. Reports of the work of the Extension Service, dairy record blanks, farm account blanks, boys' and girls' club circulars, lists of books, and so forth, can be had upon request.

19. **CO-OPERATION WITH OTHER ORGANIZATIONS.** — The aim of the Extension Service is to co-operate with existing organizations so far as possible. It

is, therefore, glad to help local organizations and welcomes suggestions from such organizations as town officers, local granges, farmers' clubs, women's clubs, Y. M. C. A.'s, Y. W. C. A.'s, boards of trade, village improvement societies, teachers, clergymen, librarians and others interested in agriculture and country life.

20. INFORMATION BY CORRESPONDENCE. — Besides these things already mentioned thousands of helpful circulars and bulletins are printed and distributed, hundreds are helped through personal visits to farms, and still larger numbers through letters of inquiry which always receive the most careful attention from every department of the institution.

Pamphlets and bulletins are sent free to all who ask for them, and correspondence from any who desire such help as has been mentioned is gladly received. Address all communications to the Director of the Extension Service, Massachusetts Agricultural College, Amherst, Mass.

GENERAL INFORMATION.

GENERAL INFORMATION.

A. FINANCIAL AND ADMINISTRATIVE.

STUDENT EXPENSES.

TUITION.¹ — Tuition is free to residents of Massachusetts. Students who are not residents of Massachusetts are charged a tuition fee of \$40 a year. The tuition charged persons not citizens of the United States is \$120 a year. Students entering from Massachusetts are required to file with the president a statement signed by either town or city clerk stating that the applicant's father is a legal resident of Massachusetts; a similar statement is required of those entering from other States.

DORMITORIES AND BOARD. — The college has dormitory accommodations for about 62 students. The rooms in the dormitories are occupied by the upper classmen, hence new students find it necessary to room in private houses. The rooms in the college dormitories are unfurnished; for the most part they are arranged in suites of three, — one study room and two bed rooms. These rooms are heated by steam and lighted by electricity; they are cared for by students occupying them. The dormitory rent for each person varies from \$39 to \$66 a year. The rent for furnished rooms in private houses ranges from \$1 to \$3 a week for each occupant. Correspondence in regard to rooms should be addressed to the dean of the college.

Board may be obtained at the college dining hall. At present the price of board there is about \$4 a week. Board is furnished at cost, the price being determined by adding 5 per cent. to the audited rate for the previous three months, and at the end of the period final settlement is made on the basis of actual cost.

EXPENSES.

The necessary college expenses are estimated as follows: —

Tuition: citizens of Massachusetts free; other citizens of the United States, \$40 a year; foreigners, \$120 a year.

	Low.	High.
Room in college dormitories or in private houses,	\$39 00	\$110 00
Board in college dining hall, \$4 a week,	144 00	144 00
Laundry, 50 cents to 85 cents a week,	18 00	30 00
Military uniform, first year,	17 85	17 85
Laboratory fees,	2 00	20 00
Books, stationery and miscellaneous items,	19 15	28 15
	<hr/>	<hr/>
	\$240 00	\$350 00

OTHER EXPENSES. — Prospective students should understand that the above estimates cover expenses which may be called strictly college expenses, and that there are other financial obligations voluntarily placed upon students

¹ This statement applies to those registering as regular or unclassified students.

which they should expect to meet. Chief among these are class assessments and taxes levied for maintenance of various organizations, such as the Social Union, Athletic Association, weekly publications, etc. Such expenses vary from \$15 to \$30 a year. Additional financial responsibility is also assumed by students joining a fraternity or entering into other social activities of the college. Students rooming in college dormitories are obliged to equip their own rooms with furniture. The college assumes no responsibility in regard to the safe keeping of student property either during the college term or vacations, except under such special arrangement as may be made with the treasurer. Besides the amount necessary for clothes and traveling, the economical student will probably spend between \$250 and \$350 per year.

INITIAL CHARGES.

At the opening of the college year, before students are registered in their classes, the following charges are payable at the treasurer's office:—

	Freshmen.	Sophomores.	Juniors and Seniors.
Board (if at college dining hall) four weeks in advance,	\$16 00	\$16 00	\$16 00
Subscription to "Signal" (college paper), ¹	1 50	1 50	1 50
Assessment for support of Social Union,	1 00	1 00	1 00
Laboratory fees:—			
Chemistry,	5 00	—	—
Zoölogy,	—	2 00	—
For elective subjects,	—	—	1 00-10 00
Military uniform,	17 85	—	—
Room rent (if in college dormitory),	—	—	19 50-33 00
Student tax for support of athletics, ¹	8 00	8 00	8 00
	\$49 35	\$28 50	\$47 00-\$69 50

¹ While this is not essentially a college charge, the treasurer of the college acts as collector for the student activity, and all students are expected to make the payment as indicated. The subscription price of the "Signal" is fixed by the managers; the amount of athletic tax by vote of the student body.

LABORATORY FEES.

The principles observed in establishing laboratory fees are the requirement that students pay for those materials actually used which cannot be supplied by the individual, and that the laboratory fees include a charge sufficient to guard against wanton waste and breakage.

Agronomy:—	Per Semester.
Course 3,	\$1 50
Course 4,	0 50
Courses 5 and 6,	1 00

Animal husbandry:—	
Courses 2 and 4,	\$1 00
Course 7,	2 00

Botany:—		Per Semester.
Courses 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16,		\$3 00
Course 4,		2 00
Course 5,		1 00
Chemistry:—		
Courses 1, 2, 7, 8, 13, 15,		3 00
Courses 3, 4, 5, 6,		4 00
Courses 9, 10, 11, 12, 14, 16,		5 00
Dairying:—		
Courses 1, 2, 3,		1 00
Entomology:—		
Courses 3, 4,		3 00
Landscape gardening:—		
Landscape gardening 1, 2,		2 50
Landscape gardening 3, 4, 7, 8,		3 00
Landscape gardening 6,		1 00
Drawing 1, 2,		2 50
Mathematics:—		
Courses 6, 10,		1 00
Microbiology:—		
All courses, each,		5 00
Pomology:—		
Courses 3, 4,		2 50
Poultry husbandry:—		
Course 3,		1 50
Course 4,		2 00
Zoölogy:—		
Course 1,		2 00
Courses 3, 4,		4 00
Dairying 1, 2, 3, 4,		1 00

STUDENT AID.

SELF HELP. — Many students are obliged to find work of some sort to earn their way through college. A few men have met their entire expenses in this manner, many more have paid a large part of their expenses, and many have earned a small proportion of the cost of their college education; but the college recommends that no new student enter without having at least \$150 with which to pay his way until he can establish himself in some regular work. The college does not encourage students to enter without money in the expectation of earning their way entirely. The ordinary student will find it better either to work and accumulate money before coming to college, or to take more than four years in completing his college course, or, instead, to borrow money sufficient to carry him through. No student should undertake work that interferes with his studies, and students should understand that, owing to the large number of applications for employment, no one man can receive a large amount of work at the college. A number of students find opportunities for earning money without depending upon the college to furnish them with work.

So far as possible needy students will be employed in some department of the college. The divisions of agriculture and horticulture usually afford the most work, although there are several permanent janitorships available for students, and sixty or more students are employed at the dining hall.

Applications for student labor should be made directly to the President. Applicants are required to present statements from parent or guardian and from a selectman or alderman of the town or city in which they reside, showing that the applicant needs assistance. Students whose deportment or class work is not satisfactory are not likely to be continued in student labor. The most desirable and responsible positions are naturally assigned to those needy students who have been in the institution longest and who have demonstrated their need and ability. Students, therefore, may find it rather difficult to obtain all the work they desire during their freshman year; as a matter of fact, however, any student who is capable of doing a variety of things, and who is a competent workman, usually finds little difficulty in obtaining all the work that he can do from the outset.

SPECIAL NOTICE TO NEEDY STUDENTS. — In the last year or two the demand for paid labor on the part of new students has far exceeded the amount of employment that the college can offer. The college cannot promise work to any student, particularly to freshmen; it accordingly urges prospective students who are dependent entirely upon their own efforts not to undertake the course before they have earned enough money to carry them through, or nearly through, the first year.

STUDENT ACCOUNTS.

The following rules are enforced concerning student accounts: —

No student will be allowed to graduate until all bills due the institution from him are paid.

College charges, such as room rent, laboratory fees and tuition, must be paid in advance, at the beginning of each semester. This rule is strictly adhered to, and no student will be allowed to register in his class until such payments are made.

Every student boarding at Draper Hall is required to pay at the beginning of each semester at least one month's board in advance; and no student will be allowed to continue to board at Draper Hall if at any time during the semester he is more than one week in arrears in his payment for board.

All money due for student labor shall at the discretion of the treasurer of the college be applied on account toward any bills that a student may owe to the institution.

STUDENT RELATIONS.

The customary high standard of college men in honor, manliness, self-respect and consideration for the rights of others constitutes the standards of student deportment.

Any student known to be guilty of dishonest conduct or practice must be reported by the instructor to the President for discipline.

The privileges of the college may be withdrawn from any student at any time, if such action is deemed advisable.

It should be understood that the college, acting through its President or any administrative officer designated by him, distinctly reserves the right not only to suspend or dismiss students, but also to name conditions under which students may remain in the institution. For example, if a student is not doing creditable work he may not only be disciplined but he may also be required to meet certain prescribed conditions in respect to his studies, even though under the foregoing rules his status as a student be not affected. The same provision applies equally to the matter of absences ("cuts"). According to the rules a student is allowed a certain percentage of absences from class

and other exercises. This permission, which implies a privilege and not a right, may be withdrawn at any time for any cause.

Similarly, also, it applies to participation in student activities. Though this will ordinarily be governed by the rules as already laid down, yet, if in the judgment of the college authorities a student is neglecting his work on account of these activities the privilege of participating in them may be withdrawn for such time as is considered necessary. Moreover, it may be withdrawn as a punishment for misconduct. Prospective students or their parents may, upon application, obtain a copy of the faculty rules governing student relations to the college.

B. COLLEGE ACTIVITIES.

GENERAL EXERCISES.

Chapel exercises are as a rule held four mornings each week. On Wednesday, instead of chapel an afternoon assembly is held, to which some prominent layman or professional man is invited to speak. The object of these assemblies is to bring to the students discussions of topics of present-day interest. A special chapel service on Sunday is usually held during the winter months. Students are required to attend these general exercises, although the president is authorized to excuse from chapel any student who may object to attendance thereon because of his religious scruples, provided his request for excuse therefrom is endorsed by his parent or guardian.

STUDENT ACTIVITIES.

A large number of student organizations furnish opportunity to students for work and leadership.

The Massachusetts Agricultural College Social Union was established about six years ago. All students become members of the Union by paying a small fee. The Union is designed to become the center of student interests. In North College it has a trophy room and a large lounging room for music, reading and study. In the basement of this building there is also a game room for pool and billiards. In the fall and winter months the Union gives a series of entertainments, free to students and faculty.

The College Senate is composed of representatives of the junior and senior classes. This body serves as a general director of under-graduate conduct, and represents before the faculty the interests of the student body.

The M. A. C. Christian Association is active both socially and religiously. Under its direction voluntary Bible classes are conducted during the winter months. A Catholic Club has also been organized.

The musical organizations include an orchestra, a mandolin club and a glee club. These furnish music for college meetings, and occasionally give concerts at the college and at other places. A military band is maintained as part of the cadet corps.

A Dramatic Club has been organized, and each year presents a play.

The Public Speaking Council represents the students' interest in debate and oratory.

The Athletic Association represents in the college the interests of football, baseball, track, hockey and tennis.

A Rifle Club has been organized for a few years. Teams representing this club have repeatedly won the intercollegiate championship of the country, both in indoor and outdoor contests.

The college publications are the "Signal," published weekly by the student body, and the "Index," published annually by the members of the junior class.

The Stockbridge Club is an organization of students especially interested in practical agriculture and horticulture. Regular meetings are addressed by outside speakers, and members present papers and engage in discussions.

Scientific clubs also exist in the departments of French, entomology, landscape gardening, and zoölogy.

C. ACADEMIC AND DEPARTMENTAL.

DEGREES.

Those who complete a four-year course receive the degree of bachelor of science. The fee for graduation from the college is \$5.

Graduate students who complete the assigned courses will receive the degree of master of science upon the payment of a fee of \$10. Credit may sometimes be allowed towards this degree for teaching or other advanced work done in some department of the college.

Graduate students who complete the required three-year course of study, and present a satisfactory thesis, will be granted the degree of doctor of philosophy.

Those to whom degrees are awarded must present themselves in person at commencement to receive them. No honorary degrees are conferred.

The honorary fraternity of Phi Kappa Phi has a chapter at the agricultural college. Students are elected to membership to this fraternity on the basis of scholarship. Elections are made from the highest fifth of the senior class who have attained an average grade of at least 85 per cent. during their college course.

PRIZES.

Prizes are given annually in several departments for excellence in study or for other special achievement. Prizes offered in 1913 were:—

AGRICULTURE.—The Grinnell prizes (first, second and third), given by the Hon. William Claflin of Boston in honor of George B. Grinnell, Esq., of New York, to those members of the senior class who pass the best, second best and third best examinations, oral and written, in theoretical and practical agriculture. They are \$25, \$15 and \$10.

ANIMAL HUSBANDRY.—The F. Lothrop Ames' Prize, given by F. Lothrop Ames, Langwater Farms, North Easton, Mass., consisting of \$150 a year, offered for a period of five years, beginning 1912, to be given to the three students standing highest in the work of advanced live-stock judging, and to be used in defraying their expenses incurred by participation in the students' judging contest at the National Dairy Show, Chicago.

BOTANY.—The Hills prizes (amounting to \$35), given by Henry F. Hills of Amherst, will be awarded to members of the senior, junior and sophomore classes as follows: for the best herbarium, \$20; for the best collection of Massachusetts trees and shrubs, \$15. No collection deemed unworthy of a prize will be considered.

GENERAL IMPROVEMENT.—The Western Alumni Association prize (\$25) is given to that member of the sophomore class who, during the first two years in college, has shown the greatest improvement in scholarship, character and example.

PUBLIC SPEAKING. — The Burnham prizes are awarded as follows: to the students delivering the best and second best declarations in the Burnham contest, \$15 and \$10, respectively. The preliminary contests in declamation are open, under certain restrictions, to freshmen and sophomores.

The Flint prizes are awarded as follows: to the students delivering the best and second best orations in the Flint contest, a gold medal and \$20 and \$15, respectively. The preliminary contests in oratory are open, under certain restrictions, to all regular students.

The prizes in debate are awarded as follows: to each of the three students ranking highest in the annual debating contest, a gold medal and \$15. The preliminary contests in debate are open, under certain restrictions, to all regular students.

EQUIPMENT.

AGRONOMY. — The work in agronomy is carried on by means of lectures, laboratory work and field work. The laboratories are in the north wing of South College. The seed laboratory is equipped with samples of the different grains and seeds of economic importance in field culture, and with apparatus for the study and testing of these seeds, including microscopes and the apparatus necessary for viability and purity tests. The soil laboratory is equipped with apparatus for studying the physical properties of soils, and with tools used in the reclamation of land by drainage and by irrigation. A large part of the work is done in the field, the college farm being used as a laboratory.

ANIMAL HUSBANDRY. — An accurate and definite knowledge of the market types and grades, and of the various breeds of live stock, is fundamental to the work of this department. The department is equipped with an excellent laboratory, Grinnell Arena, which has a seating capacity of 180, and which is fully adapted to the requirements. There are upwards of 125 head of dairy cattle of various ages available for class-room work; among these are included superior representatives of the Jersey, Guernsey, Ayrshire and Holstein breeds. There are flocks of pure-bred Shropshire and Southdown sheep of the best breeding and individuality. Considerable numbers of pure-bred Berkshire and Yorkshire pigs are maintained. The college possesses pure-bred Percherons and French coach horses, besides many work teams of different types, which are available for class-room purposes. A set of plaster of Paris models of individuals of foreign and domestic breeds of horses; cattle, sheep and swine, and a collection of the different foodstuffs available for the use of the New England farmer, are included in the equipment for this work. This equipment is being added to from time to time as funds are available.

BOTANY. — The department of botany occupies Clark Hall, a brick building 55 by 95 feet, two stories high, with basement and attic. It has two lecture rooms, one seating 154 and the other seating 72 people; one seminar and herbarium room; a large laboratory for sophomore and junior work, and one for senior work; and three rooms specially fitted for graduate students. The experiment station laboratories devoted to botanical research are also in this building. A small museum contains material especially useful in the teaching and illustration of plant phenomena; and on the third floor is a collection of Massachusetts timber trees, specimens showing peculiar formations of plant growth, and various specimens illustrative of scientific methods of treating trees.

The laboratories and lecture rooms are of modern construction, finely lighted and supplied with all necessary conveniences. The basement con-

tains a bacteriological laboratory, a seed and soil room; and a convenient workshop provided with benches for wood and metal work, an electric motor, a power lathe, and other tools and appliances. In the senior laboratory is a room designed especially for physiological work; this laboratory is well supplied also with apparatus for the study of simple phenomena in plant physiology, such as respiration, metabolism, transpiration, heliotropism, etc. The herbarium contains 15,000 species of flowering plants and ferns, 1,200 sheets of mosses, 1,200 sheets of lichens and liverworts, and about 12,000 sheets of fungi. The laboratory is equipped with 90 modern compound microscopes and a number of dissecting microscopes, microtomes and a large series of charts. A conservatory 28 by 70 feet is connected with the laboratory. This is designed for experiment work and for housing material often needed in the laboratory.

CHEMISTRY. — The chemical department of the college occupies the entire building previously known as the "old chapel." The basement is used for the storage of apparatus and chemicals. The first floor contains large laboratories devoted to qualitative and quantitative analysis and organic and physiological chemistry. The second floor is occupied by the general lecture room, by offices for the several members of the staff, by laboratories for physical chemistry and for beginners in quantitative analysis. The third floor has been fitted for work in general chemistry, and has desk room and hoods sufficient to accommodate 66 students at one time. Each place is supplied with reagents and apparatus for independent work. This floor is also occupied by a lecture room that will seat 100 students.

The entire laboratory is well equipped with the necessary apparatus and chemicals for all students who desire to perfect themselves as expert chemists, or who wish to study chemistry as a supplement to some other line of practical or scientific work. The equipment includes a valuable and growing collection of specimens and samples of minerals, soils, raw and manufactured fertilizers, foods, milk products, fibers, various other vegetable and animal products and artificial preparations of mineral and organic compounds; and also a series of preparations for illustrating the various stages of different manufactures from raw material to finished product.

DAIRYING. — The dairy department is now using the new dairy building, Flint Laboratory. The dairy work is done in several new laboratory rooms equipped with the best apparatus for market milk and dairy butter work. Flint Laboratory is considered one of the best equipped dairy instruction buildings in the country.

DINING HALL. — Draper Hall, a brick colonial building, equipped with the modern conveniences of a dining hall, was opened in 1903. The dining service is under the supervision of the college. The building contains a limited number of rooms for young women students.

DRAWING. — The class in drawing occupies a room on the second floor of Wilder Hall. It is equipped with tables and adjustable drawing stands. The necessary materials and implements are provided. The equipment includes drawing models, and plaster casts of leaves, flowers, fruits, human and architectural details, and garden ornaments, two universal drafting machines, an eidograph, centrolineads, a set of ship splines and French curves, complete water-color outfits, automatic crosshatchers and protractors.

ENTOMOLOGY. — **GENERAL ENTOMOLOGICAL LABORATORIES.** — The equipment for work in entomology is perhaps unexcelled in this country. In

the new fireproof entomological and zoölogical building, first used in the fall of 1910, are fine lecture rooms, laboratories and museums for use in the different courses. The senior laboratory will accommodate 70 students at one time; a desk, equipped with compound microscope and accessories, together with glassware, reagents, etc., and supplied with electric light and gas is provided for each student. Dissecting microscopes, microtomes and other apparatus are available for use. The graduate laboratory is similarly equipped, and it will accommodate 20 students. The large and rapidly growing collections of insects are in a room adjoining both laboratories. In the library of the building is an excellent collection of the more important books and journals treating of entomology, and many more are accessible in the college library and in the private libraries of the professors, in all making available more than 25,000 volumes, many of which cannot be found elsewhere in the United States. A card catalogue giving references to the published articles on different insects contains more than 60,000 cards, and is the largest index of its kind in the United States, and probably in the world. In the basement is a pump room where may be studied the construction of the different types of spray pump and methods of repairing them; hose, couplings, nozzles and the other parts of spraying outfits are provided, not only for examination but for use. In another room, provided with chemical desks and apparatus, methods for the determination of the impurities and adulterations of insecticides are taught. As the insectary of the Massachusetts Agricultural Experiment Station is in the same building the facilities it offers are also available. A greenhouse, where plants infested with injurious insects are under observation and experimental treatment, is also open to students. Photographic rooms with cameras and other photographic apparatus are provided, and the large greenhouses, gardens, orchards and grounds of the college offer further opportunities for the study of injurious insects under natural conditions.

ENTOMOLOGY. — BEEKEEPING. — For this work the main office, museum and lecture rooms are in the entomological building. There is also an apiary covering approximately two acres which will consist of about fifty colonies of bees in various types of hives and maintained for the several practical and experimental purposes. The apiary also includes a collection of nectar-yielding plants representative of the native flora as well as of the more important nectar sources from other localities. Especial opportunity is therefore given for a study of this fundamental problem of forage. Upon the apiary site is an eight-room building (the first in the world erected exclusively for teaching beekeeping) modeled to meet both the requirements of teaching and of a practical apiary. This building contains a boiler room, capacious wintering cellar, wax extraction room, general carpenter and work shop, laboratory, office, honey extraction room and stock room. The beekeeping equipment also includes an unexcelled collection of apicultural implements, natural history specimens and other curiosities. Practically every device used in American apiculture is available, it being the aim of the department to procure new inventions and implements as fast as they appear for the purpose of study and comparison. Available to the students is a private library of apicultural literature consisting of upwards of 700 volumes and papers, possibly the most complete collection in the country. This entire equipment is acknowledged unique in model and in completeness for the United States and for the world.

FARM ADMINISTRATION.—The college farm of 250 acres is under the general supervision of the Department of Farm Administration, and furnishes demonstration material. It includes improved land, pasture land and a farm wood lot. The improved land illustrates the value of good culture and the best known methods for the maintenance of fertility. The farm is equipped with suitable buildings and good machinery for the work carried on, of which the production of certified milk is an important branch. Several good farms in the vicinity, illustrating types of both special and general agriculture, may be inspected and studied.

AGRICULTURAL EDUCATION.—The courses in this department are planned primarily for those who are preparing to teach. The work is carried on by means of lectures, library and demonstrations. The department has an office, lecture room and a laboratory in the Veterinary Science building. The laboratory is equipped with a balance, dishes, jars, reagent bottles, test tubes, petri dishes, lenses, a Babcock test, a Wisconsin sediment test, Bunsen burner, hot and cold water, electricity, gas and other appliances for giving demonstration and practice lessons in Secondary Agriculture. There is also equipment for conducting children's gardens on the campus. Instruction in school gardens constitutes a part of the practice work of those training for the occupation of teaching. Some practice work in teaching is done in the grammar grades of the Amherst schools, and in the agricultural departments of Hopkins' Academy, and Smith's Agricultural School at Northampton. This department is also intimately related to the matter of recommending candidates for teachers' certificates. At least four courses in the department are required of students preparing for such certificate. The office is supplied with school and college reports, also a large number of pamphlets and bulletins relating to the subject of agriculture in the schools, courses of study, etc. See note relative to teachers' certificates, under major in Agricultural Education.

FLORICULTURE.—The department of floriculture aims to give the student a thorough knowledge of all phases in greenhouse design and construction and greenhouse heating, and in the culture of florists' crops. It is intended to train men for commercial floriculture and for the management of conservatories on private estates and parks and in cemeteries. The course is outlined to combine theoretical, technical and practical work in the most comprehensive manner possible. Probably no agricultural college has a department of floriculture better equipped than this. There has been erected a durable, practical, commercial range, composed of palm, fern, orchid, violet, carnation, rose and students' houses. French Hall, with its large laboratories, class rooms and offices, furnishes excellent facilities for the purposes of instruction. Besides the new glass houses, there are older houses suitable for growing bedding plants and chrysanthemums, and frames for the growing of annual and herbaceous perennial plants, violets and pansies. Many excellent specimens of trees and shrubs are growing on the college grounds, furnishing valuable material for the study of plant materials.

FORESTRY.—The department of forestry has an unusually complete equipment of the various instruments used in forest mensuration, forest mapping and engineering, timber estimating, log scaling, board measuring, etc.; a large assortment of boards illustrative of the various commercial woods found in the lumber markets. The State Forest Nursery, comprising 6 acres of land and containing, approximately, 5,000,000 trees, transplants

and seedlings is located on the college farm. Extensive forests containing every variety of tree common to New England are within walking distances of the college. The college campus affords an arboretum containing an exceptionally large number of trees not native to New England. The library contains complete sets of government bulletins, circulars, State reports and all the best books on forestry subjects.

GEOLOGY. — A large, well-lighted laboratory for geology, 27 by 50 feet, is in the basement of the new building for entomology, zoölogy and geology. This is equipped with cabinets, models, charts and a teaching collection of rocks. It has a seating capacity of 50 persons. Adjoining this is a smaller laboratory, 21 by 27 feet, for mineralogy, supplied with gas and cabinets for models, crystals and minerals. There is also a small laboratory for grinding thin sections, and a private laboratory, 6 by 19 feet, for analysis work. The geological museum is 27 by 48 feet. It has six large cases for exhibition purposes.

The equipment for geology is being enlarged. At present, in addition to the general items mentioned above, it consists of a petrographic microscope, an illustrative series of thin sections, a small collection of invertebrate fossils, some casts of vertebrate fossils, a collection of the building stones of Massachusetts, and a duplicate set of the Edward Hitchcock survey collection of the rocks and minerals of Massachusetts.

HEATING, LIGHTING AND POWER. — The college supplies its own light, heat and power, including electricity for the night lighting of the campus and its approaches. The machinery of the barn, the dairy and other buildings is operated by electricity generated at the power-house. The college has also a machine shop and well-equipped carpenter shop.

LANDSCAPE GARDENING. — The work in landscape gardening is developed in a strong technical four-year course; the first two years are occupied with required studies, including botany, horticulture, surveying and mathematics, and the last two years are devoted to more specialized studies in landscape gardening, arboriculture, floriculture, entomology, botany and mathematics. The environment is unusually favorable. The strictly technical work in landscape gardening is taught in light and comfortable drafting rooms, fully furnished with instruments and accessories for thorough work. There is a well-selected library, and the equipment of surveying and drafting instruments is unusually complete and practical.

LIBRARY. — The library — stack room, reading room and office — occupies the entire lower floor of the Chapel-library building. It contains nearly 42,000 volumes and a large number of pamphlets, hitherto inaccessible, but which are being put into good working order as fast as possible. Works of a scientific character predominate, but economics, literature and history are well represented and are receiving due attention. The reading room provides a variety of periodical literature, both technical and popular, encyclopedias and general reference books.

The library is now being reclassified and recatalogued, to make the splendid collection of material here gathered together readily accessible and of the greatest working value. Every effort is being made toward developing the library into a vital intellectual center of college life, of equal value to every student, teacher and teaching department. In consequence, only the most cordial relations are cherished, and the fewest and most imperative rules concerning the circulation of books and deportment are enforced.

Lectures are given to regular and short-course students to enable them to make the best use of the library. Emphasis is laid upon the proper use of the card catalogue, periodical indexes, bibliographies and guides; also, in general, assigned and class-room work, and essay and debate work.

The library hours are from 7.30 A.M. to 9.30 P.M. every week day, and from 9 A.M. to 2 P.M. on Sundays, in term time. Shorter hours prevail during vacations.

MARKET GARDENING. — The purpose of the courses in market gardening is to acquaint the student with the theories and practice of market gardening so that he will be able to carry on the business intelligently. The equipment available for practical work consists of 10 acres of good gardening land; a large collection of horse and hand garden tools; hot-beds and cold-frames; and lettuce, cucumber and tomato houses. The students therefore have opportunity both to study and to practice the important branches of the business. Classes are taught in French Hall, a new building fitted with class rooms and laboratory particularly equipped for market gardening. A good library of works on vegetable gardening is available.

MATHEMATICS AND CIVIL ENGINEERING. — *Surveying*. — The department has a considerable number of the usual surveying instruments, with the use of which the students are required to become familiar by doing field work. Among the larger instruments are 2 plain compasses, a railroad compass with telescope, a surveyor's transit, 3 engineer's transits with vertical arc and level, a Brandis solar transit, a solar compass, an omnimeter with verniers reading to 10 seconds, adapted to geodetic work, a queen plane table, 3 wye levels, 2 dumpy levels, a builder's level, a sextant, a hand level, and a large assortment of leveling rods, flag poles, chains, tapes, etc. For drafting, a vernier protractor, a pantograph, a parallel rule, etc., are available. The department also has a Fairbanks cement testing outfit.

MILITARY SCIENCE. — This department makes use of the campus for battalion drill, and has a special building in which there is a drill room 60 by 135 feet, an armory, an office for the commandant, a field-gun and gallery practice room and a large bathroom. The national government supplies Krag-Jorgensen rifles, with complete equipments and ammunition. The State supplies instruments for the college band. Students are held responsible for all articles of public property in their possession. The college owns an excellent target range for rifle practice, lying a short distance out of the village.

PHYSICAL EDUCATION. — The gymnasium and armory has a floor space of 5,000 square feet, and is 30 feet high, well lighted and ventilated. The main floor is used for basket ball, indoor baseball and hand ball. The gallery has been fitted up as a special exercise and gymnastic room, and is equipped with modern developing apparatus, including parallel bars, horses, bucks, chest weights, dumb bells, Indian clubs and striking bags. An outdoor board track enables students to secure track practice through the winter, and two ice hockey rinks give ample opportunity for hockey practice. Credit is given to all students taking part in outdoor activities. "Treks" are held twice a week, and whenever possible snowshoe and skiing hikes are also held. Steel lockers and bathrooms have been installed in North and South colleges, and the gymnasium has been fitted with a shower-room. The gymnasium classes are held the last two hours in the morning and the last two hours in the afternoon, but students may use the gymnasium at other times for exercise purposes

by arrangement with the Department. The regulation costume for class exercise consists of a white track suit and white rubber-sole shoes.

PHYSICS. — Among the apparatus in use for instruction in general physics are a set of United States standard weights and measures, precision balances, a spherometer, vernier calipers, a projection lantern, etc.; in mechanics, a seconds clock systems of pulleys and levers, and apparatus to illustrate the laws of falling bodies and motion on an inclined plane, and the phenomena connected with the mechanics of liquids and gases. The department is equipped with the usual apparatus for lecture illustration in heat, light and sound; in electricity, the equipment consists of apparatus for both lecture illustration and laboratory work, including a full set of Weston ammeters and volt meters, a Carhart-Clark standard cell, a Mascart quadrant electrometer, a Siemens electro-dynamometer, and reflecting galvanometers and Wheatstone bridges for ordinary determinations of currents and resistances.

POMOLOGY. — The department of pomology has 20 acres of orchard, including apple, pear, peach, plum, cherry and quince trees. Of particular interest is the large collection of these fruits on the various dwarf stocks, showing many types of training. The recent revival of interest in dwarf fruits makes these dwarf orchards of especial value to students. There are also two commercial vineyards, and a smaller one in which are shown the principal types of trellis and the leading methods of training grapes. Several acres are used in growing the various kinds of small fruits, such as strawberries, raspberries, blackberries, currants and gooseberries. There are also nurseries, where all of these various types of fruits are grown, in which students may see them in all stages of development.

The department has a good equipment of orchard and nursery tools of all the principal types, the use of which enables students to learn the value of each type. For other orchard operations, such as spraying and pruning, the most approved makes of pumps, nozzles, pruning saws, knives, etc., are provided. For laboratory work in systematic pomology there is a collection of more than 100 wax models of apples, plums, pears and peaches, in natural colors, which are particularly valuable in identifying varieties of these fruits unknown to the student. The laboratory is also furnished with a large number of reference books on pomology; and fruit in a fresh condition is available in great variety, not only from the college orchards but from other parts of Massachusetts and from many other States. In 1912-13, for instance, apples for class use were received from Idaho, Missouri, Utah, Washington, Maine, Connecticut, Pennsylvania, Montana, Minnesota, Nebraska, Kentucky, Iowa, Wisconsin, Michigan, New York, Kansas, Colorado, Oregon, New Jersey and Vermont, besides collections of grapes from California and citrus fruit from Florida and Texas. From the college fruit plantations the following fruits were available: grapes, twenty-four varieties, representing three native American species and several hybrids; six varieties of peaches, ten varieties of pears, eight varieties of plums, forty-six varieties of apples.

POULTRY HUSBANDRY. — The poultry plant consists of about 9 acres of land sloping gently to the west. The soil is a fine, rich, sandy loam, well drained. At present the buildings consist of an incubator cellar, 22 by 34 feet, with a capacity of 4,000 eggs, over which is a demonstration building; a pipe brood house (open-pipe system), 14 by 72 feet, which will accommodate 1,200 chickens; a long laying house, 14 by 180 feet, which accommodates 500 layers and furnishes facilities for student work in pen management; a

laboratory, 14 by 80 feet, for killing, picking, dressing, crate fattening, cramming, etc.; a storage building, 28 by 42 feet, for experimental incubation, poultry carpentry, poultry mechanics and storage; an experimental breeding house, 18 by 60 feet; the 6 old experiment station buildings, each 12 by 18 feet, to be used as breeding houses; 14 colony houses, 18 by 30 feet; 8 growing crops; a manure shed, 14 by 18 feet; and an oil house, 10 by 12 feet. Instruction in this department is given in the form of lectures, demonstrations and practical work. The practical work consists of poultry carpentry, caponizing, killing, picking, dressing, packing and selling poultry; pen management and fattening; running incubators and brooders, etc. At present the stock consists of 20 leading varieties of poultry. The aim of the department is to keep good specimens of all the most popular varieties of chicken, ducks and geese, so that a thorough course in poultry judging may be given, and that visitors may find the inspection of our stock an education in itself.

PUBLIC SPEAKING. — In connection with the work in public speaking, three regular contests are held during the year. The Burnham contest in declamation is open to freshmen and sophomores; the Flint contest in oratory and the annual debating contest are open (under restrictions) to all regular students. These contests furnish a very practical and necessary experience to all students interested in improving themselves in the art of public speaking. Prizes are given for excellence in the contests. Intercollege contests are arranged by the Public Speaking Council. One credit is given, except to freshmen, for a year of work in the College Debating Club.

VETERINARY SCIENCE. — The department of veterinary science occupies a modern laboratory and hospital stable, built in accordance with the latest principles of sanitation. Every precaution has been taken in the arrangement of details to prevent the spread of disease, and to provide for effective heating, lighting, ventilation and disinfection.

The main building contains a large working laboratory for student use, and several small private laboratories for special work. There are a lecture hall, a museum, a demonstration room, a photographing room and a work shop. The hospital stable contains a pharmacy, an operating hall, a post-mortem and dissecting room, a poultry section, a section for cats and dogs, and 6 sections, separated from each other, for horses, cattle, sheep and swine. The laboratory equipment consists of a dissectible Auzoux model of the horse and Auzoux models of the foot and the leg, showing the anatomy and the diseases of every part. The laboratories also have modern, high-power microscopes, microtomes, incubators and sterilizers, for work in every department of veterinary science including pathology, serology and parasitology. There are skeletons of the horse, the cow, the sheep, the dog and the pig, and a growing collection of anatomical and pathological specimens. The lecture room is provided with numerous maps, charts and diagrams.

ZOOLOGY. — The college offers increased facilities for the study of Zoölogy. In the new building for entomology, zoölogy and geology are capacious laboratories for both undergraduate and graduate work. On the first floor is a large sophomore laboratory, 27 by 100 feet, with a present seating capacity of 100 persons. Adjoining this is a smaller room, 20 by 27 feet, for junior and senior courses. On the second floor is a laboratory, 20 by 32 feet, for advanced work. All laboratories are equipped with gas. The equipment consists of 80 compound microscopes and accessories, 70 dissecting microscopes,

microtomes and accessories, paraffine baths, incubator, dissecting instruments, glassware and other necessary apparatus.

The large amphitheater lecture hall is used jointly by the departments of entomology and zoölogy-geology. It is equipped with charts and models. The zoölogical museum is drawn upon at all times for illustrative material. The zoölogical museum is 27 by 48 feet. The main room is on the first floor of the building. Above this, on a level with the second floor, is a large gallery. On the main floor are 8 large wall cases and 5 large floor cases for exhibition purposes. The gallery has 1 large wall case and 3 floor cases with space for 9 additional cases. The zoölogical collection consists of nearly 12,000 specimens. All the chief phyla are represented. Adjoining the museum is a preparator's room for the curator. The museum is open to the public from 1 to 5 P.M. on Saturdays, and on other week days from 3 to 6 P.M. The curator is Associate Professor Gordon.

PRIZES AND AWARDS, 1913.

GRINNELL PRIZES. — The Grinnell prizes, given by the Hon. William Claflin of Boston in honor of George B. Grinnell, Esq., of New York to those members of the senior class who pass the best, second best and third best examinations, oral and written, in theoretical and practical agriculture, were awarded as follows: —

First prize, \$25, awarded to Allister Francis McDougall.

Second prize, \$15, awarded to Stuart Dodds Samson.

Third prize, \$10, awarded to Ralph Hicks Gaskill.

BOTANICAL PRIZES. — The Hills prizes, given by Henry F. Hills of Amherst; no competition in 1913.

GENERAL IMPROVEMENT. — The Western Alumni Association prize, given to that member of the sophomore class who during his first two years in college has shown the greatest improvement in scholarship, character and example, was awarded as follows: —

Twenty-five dollars to Waldo Atwood Cleveland.

PUBLIC SPEAKING. — The Burnham prizes, given to the students delivering the best and second best declarations, were awarded as follows: —

First prize, \$15, awarded to Henry Hyman Kitsis.

Second prize, \$10, awarded to Irving Boin Lincoln.

The Flint prizes, given to the students delivering the best and second best orations, were awarded as follows: —

First prize, a gold medal and \$20, awarded to Irving Boin Lincoln.

Second prize, \$15, awarded to Frederick David Griggs.

DEBATING. — The prizes in the annual debate were awarded as follows: —

Fifteen dollars and gold medal, awarded to Herbert Augustine Brown.

Fifteen dollars and gold medal, awarded to Frederick William Read.

Fifteen dollars and gold medal, awarded to Charles Holt Gould.

The prizes in the interclass debate were awarded as follows: —

To the team representing the Class of 1916, consisting of Thomas Lincoln Harrocks, Charles Holt Gould and Perez Simmons. This team was awarded a silver cup.

MILITARY HONORS. — The following-named cadet officers were reported to the Adjutant-General of the United States army and to the Adjutant-

General of the Commonwealth of Massachusetts, being efficient in military science and tactics and graduating therein with highest honors:—

Cadet Colonel James Dudley French.

Cadet Major Albert Joseph Kelly.

Cadet Major Norman Russell Clark.

Cadet Captain Albert Franklin Edminster.

Cadet Captain John Lawrence Mayer.

Cadet Captain Allister Francis McDougall.

The prize of \$100, offered by the New York, New Haven & Hartford Railroad to that student of the Massachusetts Agricultural College, who, during the school year 1912-13, should make the best suggestion of a method by which our system of railroads can co-operate with the Massachusetts Agricultural College for the development of the agricultural possibilities of Massachusetts in particular and New England in general, was awarded to Chester King Allen.

SECRETARIES OF ALUMNI ASSOCIATIONS.

Alumni Secretaries' Association of the Massachusetts Agricultural College.

Secretary: RALPH J. WATTS, 1907, Amherst, Mass.

Associate Alumni of the Massachusetts Agricultural College.

Secretary: CHARLES A. PETERS, 1897, Amherst, Mass.

Alumni Club of Massachusetts.

Clerk: H. LINWOOD WHITE, 1909, 136 State House, Boston, Mass.

Connecticut Valley Association of the Massachusetts Agricultural College.

Secretary: CHARLES L. BROWN, 1894, 870 State Street, Springfield, Mass.

Massachusetts Agricultural College Club of New York.

Secretary: JOHN ASHBURTON CUTTER, 1882, 262 West 77th Street, New York, N. Y.

Massachusetts Agricultural College Club of Washington, D. C.

Secretary: CLARENCE H. GRIFFIN, 1904, 1864 Park Road, Washington, D. C.

Western Alumni Association of the Massachusetts Agricultural College.

Secretary: CHARLES A. TIRRELL, 1906, 4012 Perry Street, Chicago, Ill.

Massachusetts Agricultural College Pacific Coast Alumni Association.

Secretary: THOMAS F. HUNT, 1905, Berkeley, Cal.

Class Secretaries.

Class of	SECRETARY.	Secretary's Address.
1871	E. E. Thompson, . . .	5 Jacques Avenue, Worcester, Mass.
1872	F. E. Kimball, . . .	8 John Street, Worcester, Mass.
1873	C. Wellington, . . .	Amherst, Mass.
1874	D. G. Hitchcock, . . .	Warren, Mass.
1875	M. Bunker, . . .	Newton, Mass.
1876	C. Fred Deuel, . . .	Amherst, Mass.
1877	Atherton Clark, . . .	Newton, Mass.
1878	C. O. Lovell, . . .	5 Bromfield Street, Boston, Mass.
1879	R. W. Swan, . . .	41 Pleasant Street, Worcester, Mass.
1880	Alvan Fowler, . . .	413 Post Office Building, Philadelphia, Pa.
1881	J. L. Hills, . . .	59 North Prospect Street, Burlington, Vt.
1882	G. D. Howe, . . .	25 Winter Street, Bangor, Me.
1883	J. B. Lindsey, . . .	Amherst, Mass.
1884	— — —	— — —
1885	E. W. Allen, . . .	1923 Biltmore Street, Washington, D. C.
1886	Dr. Winfield Ayres, . . .	616 Madison Avenue, New York City.
1887	F. H. Fowler, . . .	Shirley, Mass.
1888	H. C. Bliss, . . .	14 Mechanic Street, Attleborough, Mass.
1889	C. S. Crocker, . . .	1003 South 25th Street, Philadelphia, Pa.
1890	David Barry, . . .	398 Walnut Street, Newtonville, Mass.
1891	H. T. Shores, . . .	177 Elm Street, Northampton, Mass.
1892	H. M. Thompson, . . .	Amherst, Mass.
1893	F. A. Smith, . . .	Turner Hill, Ipswich, Mass.
1894	S. F. Howard, . . .	Amherst, Mass.
1895	E. A. White, . . .	Ithaca, N. Y.
1896	A. S. Kinney, . . .	South Hadley, Mass.
1897	C. A. Peters, . . .	Amherst, Mass.
1898	— — —	— — —
1899	D. A. Beaman, . . .	Rio Piedras, Porto Rico.
1900	E. K. Atkins, . . .	15 Hubbard Avenue, Northampton, Mass.
1901	J. H. Chickering, . . .	Dover, Mass.
1902	H. L. Knight, . . .	1420 Buchanan Street, Washington, D. C.
1903	G. D. Jones, . . .	North Amherst, Mass.
1904	P. F. Staples, . . .	North Grafton, Mass.
1905	A. D. Taylor, . . .	1101 Tremont Building, Boston, Mass.
1906	Richard Wellington, . . .	Geneva, N. Y.
1907	Clinton King, . . .	6 Beacon Street, Boston, Mass.
1908	J. A. Hyslop, . . .	860 North Mulberry Street, Hagerstown, Md.
1909	O. B. Briggs, . . .	1015 Fidelity Building, Baltimore, Md.
1910	F. L. Thomas, . . .	Amherst, Mass.
1911	L. M. Johnson, . . .	Newtown, Conn.
1912	F. S. Madison, . . .	East Greenwich, R. I.
1913	B. W. Ellis, . . .	Segreganset, Mass.

DEGREES CONFERRED AND
ROLL OF STUDENTS.

DEGREES CONFERRED — 1913.

MASTER OF SCIENCE.

Watkins, John Bedford, Midlothian, Va. Virginia Polytechnic, B.Sc., 1911.

BACHELOR OF SCIENCE (B.Sc.).

Adams, Winford Frederick,	East Leverett.
Allen, Harry Willis,	West Pelham.
Anderson, Oscar Gustaf,	East Pepperell.
Angier, Harris William,	Westborough.
Baird, Harry Albert,	Somerville.
Baker, Dean Foster,	Fairhaven.
Barber, George Ware,	Hyde Park.
Bevan, Laurence Algur,	Newtonville.
Birdsall, Webster Jennings,	Otego, N. Y.
Borden, Ralph James,	Fall River.
Brewer, Charlesworth Herbert,	Mt. Vernon, N. Y.
Brown, Herbert Augustine,	Saxonville.
Bullard, Alvan Henry,	South Framingham.
Burby, Lawrence Walter,	Chicopee Falls.
Bursley, Harold Barrows,	Peabody.
Carver, John Stuart,	Roslindale.
Clark, Norman Russell,	Millbury.
Cobb, Joseph Boyd,	Chicopee Falls.
Cole, Arlin Tower,	West Chesterfield.
Cole, Flora Atwood,	Newton.
Coleman, Isaac,	Amherst.
Cooper, Everett Hanson,	Greenwood.
Cory, Harold,	Rutherford, N. J.
Covill, Joseph Warren,	Roxbury.
Cristman, Clyde Edward,	Dalton.
Culley, Frank Hamilton,	Marshalltown, Ia.
Curtis, Harold William,	Belchertown.
Daniel, Edward Stephen Coen,	Osterville.
Dayton, James Wilson,	Georgetown, Conn.
Dooley, Thomas Patrick,	South Boston.
Drury, Lewis Floyd,	Rutland.
Edminster, Albert Franklin,	Brooklyn, N. Y.
Eisenhaure, John Louis,	North Reading.
Ellis, Benjamin Ward,	Plymouth.
Ells, Gordon Waterman,	Haverhill.
Fay, Robert Sedgwick,	Monson.
Forbush, Wallace Clifford,	Rutland.
French, James Dudley,	Hyde Park.
Gaskill, Ralph Hicks,	Amherst.
Gore, Harold Martin,	Wollaston.
Greenleaf, George Freeman,	Brockton.
Griggs, Frederick David,	Chicopee Falls.
Harris, Burton Adams,	Wethersfield, Conn.
Hasey, Willard Harrison,	Campello.
Hatch, Herbert Tilden,	Atlantic.
Headle, Herbert Wallace,	Bolton.
Headle, Marshall,	Bolton.

Holden, James Loomis,	Palmer.
Howe, Glover Elbridge,	Marlborough.
Howe, Ralph Wesley,	East Dover, Vt.
Huntington, Samuel Percy,	Lynn.
Hutchings, Herbert Colby,	South Amherst.
Hyland, Harold Wilson,	Weymouth.
Jones, Harold Frederic,	Campello.
Jordan, Simon Miller,	Rutherford, N. J.
Kelley, Albert Joseph,	Roxbury.
Kelley, Bernard Jenkins,	Harwichport.
Kenney, Frederick Alfred,	Charlestown.
Larsen, Nils Paul,	Bridgeport, Conn.
Lesure, John Warren Thomas,	Fitchburg.
Little, Willard Stone,	Newburyport.
Lowry, Quincy Shaw,	Canton.
Lyon, Harold,	Somerville.
Macone, Joseph Augustine,	Concord.
Mallett, George Alfred,	Bridgeport, Conn.
Matz, Julius,	Lynn.
Mayer, John Lawrence,	South Boston.
McDougall, Allister Francis,	Westford.
Moir, William Stuart,	Boston.
Murray, Joseph Wilbur,	Holyoke.
Neal, Ralph Thomas,	Mattapan.
Nichols, Norman Joseph,	Everett.
O'Brien, James Leo,	Wayland.
Packard, Clyde Monroe,	Springfield.
Pease, Lester Newton,	Meriden, Conn.
Pillsbury, Joseph James,	West Bridgewater.
Post, George Atwell,	Richmond Hill, N. Y.
Roehrs, Herman Theodore,	New York, N. Y.
Samson, Stuart Dodds,	Grand Isle, Vt.
Selden, John Lincoln,	Northampton.
Serex, Paul, Jr.,	Jamaica Plain.
Sheehan, Dennis Anthony,	South Lincoln.
Shute, Carl August,	Quincy, Ill.
Streeter, Charles Marsh,	Brimfield.
Thayer, Clark Leonard,	Smith's.
Tucker, Waldo Guy,	Lynn.
Van Zwaluwenburg, Reyer Herman,	Rutherford, N. J.
Walker, Charles Dexter,	Greenwich Village.
Whitney, Francis Wellington,	Wellesley.
Zabriskie, George, 2d,	New York, N. Y.

GRADUATE STUDENTS — CANDIDATES FOR A DEGREE.

Ackerman, Arthur John,	Worcester.
B.Sc., Massachusetts Agricultural College, 1912.	
Baird, Charles Glenn,	Cedar Rapids, Neb.
A.B., University of Kansas, 1911: A.M., University Wyoming, 1913.	
Beals, Carlos Loring,	Sunderland.
B.Sc., Massachusetts Agricultural College, 1912.	
Bogue, Robert H.,	North Amherst.
B.Sc., Tufts, 1912.	
Bourne, Arthur Isreal,	Kensington, N. H.
A.B., Dartmouth, 1907.	
Brown, Adrian Abbott,	Waterloo, Wis.
B.Sc., in Agriculture, University of Wisconsin, 1912.	
Brown, Henry Leavitt,	Ayer.
B.Sc., University of Maine, 1913.	
Copson, Godfrey Vernon,	Grand Rapids, Mich.
B.Sc., in Agriculture, Oregon Agricultural College, 1911.	
Davies, Ernest Langford,	Toronto, Can.
B.Sc., in Agriculture, Toronto University, 1913.	

Fiske, Raymond John,	Stoneham.
B.Sc., Massachusetts Agricultural College, 1910.	
Fowler, George Scott,	Wayland.
B.Sc., Massachusetts Agricultural College, 1912.	
Georgia, Bert Cyrenius,	Ithaca, N. Y.
B.Sc., Cornell University, 1913.	
Hillary, Walter Hoxie,	Philadelphia, Pa.
B.S., Pennsylvania State College, 1913.	
Holland, Edward Bertram,	Amherst.
M.S., 1892, Massachusetts Agricultural College.	
Hutson, John Coghlan,	Bridgetown, Barbados.
B.A., Oxford University, England, 1909.	
Itano, Arai,	Okayamaken, Japan.
B.Sc., Michigan Agricultural College, 1911.	
Lund, Russell Fort,	West Pelham.
B.A., St. Lawrence University, 1909.	
Mackay, Charles R.,	Portsmouth, Va.
B.S., Virginia Polytechnic, 1911.	
McLaughlin, Frederick Adams,	Lee.
B.Sc., Massachusetts Agricultural College, 1911.	
Martin, James Francis,	Amherst.
B.Sc., Massachusetts Agricultural College, 1912.	
Norton, John Buck,	Hartford, N. Y.
B.Sc., University of Vermont, 1913.	
Noyes, Harry Alfred,	Lafayette, Ind.
B.S., 1912, Massachusetts Agricultural College.	
Parker, Ralph Robinson,	Penikese.
B.Sc., Massachusetts Agricultural College, 1912.	
Robinson, Harold Averill,	Elmwood, N. H.
B.Sc., New Hampshire State College, 1913.	
Ruprecht, Rudolph William,	Brooklyn, N. Y.
B.Sc., Rhode Island Agricultural College, 1911.	
Sanctuary, William Crocker,	Amherst.
B.Sc., Massachusetts Agricultural College, 1912.	
Serex, Paul, Jr.,	Bloomfield, N. J.
B.Sc., Massachusetts Agricultural College, 1913.	
Shoeman, Nichols Henry,	Cesaria, Turkey.
Harpoot, Turkey, Euphrates College, 1907.	
Smith, Raymond Goodale,	Lynn.
B.Sc., Massachusetts Agricultural College, 1911.	
Smulyan, Marcus Thomas,	Amherst.
B.Sc., Massachusetts Agricultural College, 1909.	
Strand, Carl John,	Brattleboro, Vt.
A.B., Augustana College, 1907; M.A., University Illinois, 1908.	
Thayer, Clark Leonard,	Enfield.
B.Sc., Massachusetts Agricultural College, 1913.	
Thomas, Frank Lincoln,	Athol.
B.Sc., Massachusetts Agricultural College, 1910.	
Tower, Daniel Gordon,	Roxbury.
B.Sc., Massachusetts Agricultural College, 1912.	

GRADUATE STUDENTS — CANDIDATES FOR NO DEGREE.

Chamberlain, Edwin Martin,	Cambridge.
A.B., Harvard, 1911.	
Martindale, Henrietta,	LaCrosse, Wis.
A.B., Smith, 1913.	
McBurney, Henry,	Amherst.
B.S., Massachusetts Institute Technology.	
Patton, Hamilton,	Highland Park, Ill.
B.A., Amherst, 1913.	
Toppan, Cushing,	Cambridge.
A.B., Harvard, 1908.	
Whittier, Warren Faxon,	Amherst.
A.B., Harvard, 1909.	
Wright, David Sanderson,	Northampton.
B.A., Amherst College, 1909.	

ROLL OF STUDENTS.

SENIOR CLASS.

Abbott, Leslie Elmer,	Sandwich,	10 North College.
Allen, Carl Murdough,	Holyoke,	16 South College.
Baker, Warren Sears,	Wollaston,	9 South College.
Black, Harold Cotting,	Falmouth,	96 Pleasant Street.
Blake, Ralph Cedric, ¹	Wollaston,	6 South College.
Bokelund, Chester Story, ¹	Worcester,	2 South College.
Bradley, John Watling,	Groton,	3 South College.
Bragg, Ralph Stanley, ¹	Milford,	96 Pleasant Street.
Brewer, Harold William, ¹	Mount Vernon, N. Y.,	1 South College.
Brooks, Arthur Winslow,	Smith's,	4 South College.
Brown, Harry Dunlap,	Lowell,	96 Pleasant Street.
Calvert, Melville Bradford,	New London, Conn.,	1 North College.
Campbell, Malcolm David, ¹	Still River,	3 North College.
Christie, Edward Wheeler,	North Adams,	2 North College.
Churchill, George Clarence,	Worcester,	58 Pleasant Street.
Clark, Ernest Samuel, Jr.,	Tolland,	15 North College.
Clay, Harold Johnson,	Cambridge,	16 South College.
Clegg, Frank Jackson, ¹	Fall River,	1 South College.
Coleman, David Augustus,	South Framingham,	3 North College.
Davies, Lloyd Garrison,	Peabody,	14 South College.
Davis, Ralph Edward,	Southbury, Conn.,	13 North College.
Davis, William Ashmun,	Northfield,	11 North College.
Dearing, Newton Howard, ¹	Brookline,	8 South College.
Dexter, Evans King, ¹	Mattapoisett,	Tower.
Dunbar, Erving Walker,	North Weymouth,	116 Pleasant Street.
Edgerton, Almon Morley,	Mittineague,	12 South College.
Edwards, Edward Clinton, ¹	North Beverly,	16 South College.
Eldridge, Harold Lockwood, ¹	Wareham,	Tower.
Foster, Stuart Brooks, ¹	West Somerville,	96 Pleasant Street.
Freeborn, Stanley Barron,	Ware,	10 South College.
Freedman, Samuel Leavitt, ¹	Roxbury,	12 North College.
Frye, Carl Raymond, ¹	South Hadley Falls,	Kappa Gamma Phi.
Fuller, George,	Deerfield,	19 Phillips Street.
Hadfield, Harold Frederic,	North Adams,	Kappa Gamma Phi.
Handy, Ralph Ellis,	Cataumet,	10 North College.
Harris, Rodney Wells,	Wethersfield, Conn.,	87 Pleasant Street.
Hazen, Edward Leonard,	Springfield,	96 Pleasant Street.
Hebard, Emory Blodgett,	Holland,	14 North College.
Heffron, Frederick,	Sherborn,	4 North College.
Hill, Charles Chase, ¹	Melrose Highlands,	Pease Avenue.
Hogg, Lawrence Jager, ¹	Lawrence,	9 North College.
Howard, Lewis Phillips,	North Easton,	16 North College.
Hutchinson, John Gouverneur,	Arlington,	14 South College.
Ingham, Earl Morris,	Granby,	19 Phillips Street.
Jacobs, Loring Humphrey, ¹	Wellesley,	25 Pleasant Street.
Jenny, Herbert Hedge, ¹	South Boston,	6 Nutting Avenue.
Jones, Dettmar Wentworth, ¹	Melrose,	10 South College.
Lecte, Richard Fowler,	Mt. Kisco, N. Y.,	81 Pleasant Street.

¹ Work incomplete.

Levine, Henry Walter, ¹	Roxbury,	12 North College.
Lincoln, Murray Danforth,	Raynham,	16 North College.
Lucas, Hoyt Dennis,	Springfield,	8 Allen Street.
Major, Joseph,	East Rutherford, N. J.,	58 Pleasant Street.
Marsh, Frank Eugene, ¹	Jefferson,	90 Pleasant Street.
Merkle, Frederick Grover,	Amherst,	North East Street.
Morrison, Harold Ivory,	Melrose,	66 Pleasant Street.
Morse, Harold John,	Townsend,	3 South College.
Needham, Lester Ward,	Springfield,	96 Pleasant Street.
Nicolet, Theodore Arthur, ¹	Fall River,	85 Pleasant Street.
Nicolet, Tell William,	Fall River,	85 Pleasant Street.
Nissen, Harry,	Boston,	85 Pleasant Street.
Norton, Leslie Howard,	Newport, R. I.,	4 South College.
Nute, Raymond Edson,	Fall River,	North College.
O'Brien, Daniel William, ¹	Wayland,	6 North College.
Oertel, John Thomas, ¹	South Hadley Falls,	116 Pleasant Street.
Parker, Ervine Franklin, ¹	Poquonock, Conn.,	96 Pleasant Street.
Payne, Roland Alfred,	Wakefield,	North Amherst.
Pellett, John Doubleday,	Worcester,	3 South College.
Peters, Chester Harry,	Clinton,	Physics Building.
Petersen, Peveril Oscar,	Concord,	4 North College.
Porter, Bennett Allen,	Amherst,	11 North College.
Powers, Richard Henry, ¹	Malden,	7 South College.
Read, Frederick William,	Boston,	2 South College.
Reid, George Alexander, ¹	Worcester,	French Hall.
Russell, Alden Hesseltine,	Watertown,	14 North College.
Sahr, Gabriel William Arthur, ¹	Boston,	15 Phillips Street.
Sherman, Joel Powers,	Hyannis,	8 South College.
Small, Francis Willard,	North Truro,	Flint Laboratory.
Smith, Leon Edgar,	Boston,	85 Pleasant Street.
Smith, Leone Ernest,	Leominster,	15 North College.
Stevens, Arthur Eben,	Lawrence,	South College.
Strange, Sarah Josephine,	Marshfield,	Draper Hall.
Tarbell, Munroe Gifford,	Brimfield,	10 North College.
Taylor, Arthur Wright, ¹	Feeding Hills,	116 Pleasant Street.
Taylor, Leland Hart,	Peabody,	15 South College.
Thurston, Arthur Searle,	Everett,	Beta Kappa Phi.
Tower, Alfred Leigh,	Sheffield,	Entomological Building.
Tupper, Arthur Somerville, ¹	Roxbury,	85 Pleasant Street.
Upton, Ernest Franklin, ¹	Salem,	13 South College.
Walker, Nathaniel Kennard,	Malden,	88 Pleasant Street.
Walker, Raymond Philip,	Taunton,	88 Pleasant Street.
Warner, Raymond Winslow,	Sunderland,	9 South College.
Webster, Louis Armstrong,	Blackstone,	16 North College.
Weigel, Arthur George,	Lawrence,	9 North College.
Wheeler, Chester Eaton,	Lowell,	87 Pleasant Street.
Whidden, Burton Clark,	Lowell,	81 Pleasant Street.
Whippen, Charles Warren,	Lynn,	2 North College.
Wing, John Govan,	Somerville,	116 Pleasant Street.
Wood, Henry Joseph,	Mendon,	82 Pleasant Street.

JUNIOR CLASS.

Alden, Charles Harold, ¹	Amherst,	East Pleasant Street.
Allen, Francis Ellwood,	Melrose,	10 Allen Street.
Anderson, Herbert Henry,	Ware,	5 Nutting Avenue.
Archibald, Herbert Hildreth,	Waltham,	11 South College.
Banister, Seth Warren, ¹	Westford,	82 Pleasant Street.
Bartlett, Edward Russell,	Newburyport,	3 Nutting Avenue.
Bartley, Hastings Newcomb, ¹	Sandwich,	6 South College.
Bemis, Willard Gilbert, ¹	North Brookfield,	12 Cottage Street.
Bennett, John Ingram, ¹	Dorchester,	66 Pleasant Street.

¹ Work incomplete.

Bishop, Chester Allen, ¹	Peterboro, N. H.,	85 Pleasant Street.
Brooks, Gardner Milton, ¹	Boston,	8 Allen Street.
Buell, Frank Weed, ¹	Clinton, Conn.,	5 South College.
Buttrick, John Willard,	Melrose,	18 Nutting Avenue.
Cale, Gladstone Hume,	Springfield,	Beta Kappa Phi.
Cande, Donald Hopkins, ¹	Pittsfield,	87 Pleasant Street.
Chase, Alexander Baxter, Jr.,	West Barnstable,	Clark Hall.
Clark, Ellis Fred,	Granby, Conn.,	North College.
Cleveland, Waldo Atwood, ¹	Baldwinsville,	Veterinary Laboratory.
Clough, Maurice Joseph, ¹	Boston,	7 South College.
Cole, Herbert Elmer, ¹	Manchaug,	Plant House.
Dalrymple, Andrew Campbell,	Revere,	3 McClellan Street.
Damon, Leon Blanchard, ¹	Melrose,	18 Nutting Avenue.
Day, George Allen, ¹	Warren,	12 Cottage Street.
Dole, Sumner Alvord,	Bardwell's Ferry,	11 North College.
Donnell, George Edwin,	Burlington,	East Experiment Station.
Doran, William Leonard,	North Dartmouth,	Beta Kappa Phi.
Draper, Earle Sumner,	Milford,	85 Pleasant Street.
Farrar, Stuart Kittredge, ¹	Springfield,	96 Pleasant Street.
Fitzgerald, Daniel James, ¹	Worcester,	Kappa Gamma Phi.
Flebut, Alpha John,	Amherst,	27 McClellan Street.
Frost, Robert Theodore, ¹	New York, N. Y.,	85 Pleasant Street.
Fuller, Richard, ¹	Salem,	16 South College.
Goodwin, Malcolm Noyes,	Newburyport,	96 Pleasant Street.
Grant, Harold Davidson,	Methuen,	3 McClellan Street.
Griggs, Raymond Bradford, ¹	Chicopee Falls,	15 South College.
Hall, George Morris, ¹	Brookline,	85 Pleasant Street.
Hall, Roderick Chesley,	Worcester,	Beta Kappa Phi.
Harper, James Edward, ¹	New Haven, Conn.,	Kappa Gamma Phi.
Harvey, Russell Wilton, ¹	Lanesville,	44 Pleasant Street.
Haskell, Willis Henry, Jr., ¹	Brooklyn, N. Y.,	116 Pleasant Street.
Hatfield, William Hollis, ¹	Wellesley,	87 Pleasant Street.
Hildreth, Paul Hughes, ¹	Newtonville,	12 South College.
Hotis, Ralph P.,	Evans Mills, N. Y.,	21 Amity Street.
Hyde, George Frederiek,	North Dana,	Beta Kappa Phi.
Hyde, Harold Gilmore,	Winchendon,	36 North Prospect Street.
Johnson, Arthur,	Bridgeport, Conn.,	7 South College.
Johnson, Rollin Eugene, ¹	Templeton,	6 Phillips Street.
Kelleher, Jerome Joseph,	Montague City,	75 Pleasant Street.
Kennedy, Worthington Chester,	Hardwick,	6 North College.
Lane, Merton Chesleigh,	South Duxbury,	Mathematics Building.
LeDue, Ashley Cudworth,	Chesterfield,	5 Nutting Avenue.
Lewis, Daniel James,	Hanson,	96 Pleasant Street.
Lewis, John Kirby,	New Haven, Conn.,	Care of Mr. E. M. Dickinson.
Lineoln, Irving Boin, ¹	Glens Falls, N. Y.,	94 Pleasant Street.
Lovejoy, John Sumner, ¹	Newburyport,	53 Lineoln Avenue.
MaeNeil, Ralph Langdel, ¹	Chelsea,	52 Amity Street.
Macy, Philip Arthur, ¹	Oak Bluffs,	53 Lineoln Avenue.
Marsh, Franklin Winter, ¹	Amherst,	18 Nutting Avenue.
Marsh, Herbert Vener,	Deerfield,	Beta Kappa Phi.
Masse, Sidney Merton, ¹	Dorchester,	6 Nutting Avenue.
McKechnie, Ray Farrar, ¹	Natiek,	Kappa Gamma Phi.
McLain, Ralph Emerson, ¹	Melrose,	5 South College.
Melican, George Deady, ¹	Worcester,	75 Pleasant Street.
Moberg, Eldon Samuel, ¹	Campello,	7 North College.
Montague, Enos James,	Northampton,	North College.
Moore, Roger Henry, ¹	Beverly,	6 Nutting Avenue.
Navas, Miguel, ¹	Barranquilla, Col., S. A.,	6 Phillips Street.
Parker, Edwin Kenney, ¹	Northampton,	East Experiment Station.
Parmenter, Ernest Brigham, ¹	Dover,	Beta Kappa Phi.
Patterson, Robert Earley, ¹	Dorchester Center,	75 Pleasant Street.
Pendleton, Harlow Libby, ¹	Dorchester,	Flint Laboratory.

¹ Work incomplete.

Perry, Gerald Eugene, . . .	Amherst, . . .	17 Amity Street.
Pike, Joseph Stevens, Jr., ¹ . . .	Somerville, . . .	3 Nutting Avenue.
Potter, George Raymond, ¹ . . .	Ludlow, . . .	44 Pleasant Street.
Price, James Albert, . . .	New York, N. Y., . . .	11 South College.
Rhoades, Paul Whitney, ¹ . . .	Malden, . . .	66 Pleasant Street.
Rogers, Harold Merriman, . . .	Southington, Conn., . . .	87 Pleasant Street.
Sauchelli, Vincent, . . .	Waterbury, Conn., . . .	11 High Street.
Sears, William Richard, . . .	Woburn, . . .	6 South College.
Severance, Verne Lincoln, . . .	South Hanson, . . .	Mathematics Building.
Sherman, Milton Francis, . . .	South Lincoln, . . .	10 Allen Street.
Simon, Isaac Barney, . . .	Revere, . . .	38 Cottage Street.
Slein, Owen Francis, . . .	New Braintree, . . .	127 South Pleasant Street.
Smith, Hyde, ¹ . . .	Worcester, . . .	12 North College.
Spicer, Eber Grant, . . .	Poughkeepsie, N. Y., . . .	44 Triangle Street.
Spofford, Chester Porter, ¹ . . .	Georgetown, . . .	Kappa Gamma Phi.
Taft, Richard Craig, ¹ . . .	Oxford, . . .	88 Pleasant Street.
Tarr, Lester Winslow, . . .	Rockport, . . .	Beta Kappa Phi.
Tower, Ralph Ernest, . . .	Becket, . . .	120 Pleasant Street.
Tower, William Reginald, . . .	Sheffield, . . .	94 Pleasant Street.
Towne, Edwin Chester, ¹ . . .	Waltham, . . .	85 Pleasant Street.
Upton, Raymond Melville, . . .	Peabody, . . .	Plant House.
Vener, Benjamin, . . .	Brockton, . . .	38 Cottage Street.
Vinal, Stuart Cunningham, . . .	Boston, . . .	8 Allen Street.
Wellington, Benjamin, . . .	Waltham, . . .	15 Phillips Street.
White, Henry Harrison, . . .	West Peabody, . . .	Beta Kappa Phi.
White, Homer Beethoven, ¹ . . .	Melrose Highlands, . . .	Apiary.
Whitmore, Philip Ferry, . . .	Sunderland, . . .	88 Pleasant Street.
Whorf, Paul Francis, ¹ . . .	Boston, . . .	87 Pleasant Street.
Wilkins, Alfred Emerson, ¹ . . .	Wakefield, . . .	116 Pleasant Street.
Wiley, Harold Cleland Clancey, ¹ . . .	Orange, . . .	Plant House.
Williams, Donald, ¹ . . .	Catasauqua, Pa., . . .	85 Pleasant Street.
Wright, Elvin Stanley, . . .	Worcester, . . .	88 Pleasant Street.

SOPHOMORE CLASS.

Aiken, Harold, . . .	Millis, . . .	42 McClellan Street.
Allen, Chester King, . . .	Quincy, . . .	82 Pleasant Street.
Anderson, Frank Albert, . . .	Somerville, . . .	13 Phillips Street.
Andrews, Francis Marshall, Jr., ¹ . . .	Manchester, . . .	53 Lincoln Avenue.
Baker, Roland Sears, ² . . .	Brooklyn, N. Y., . . .	-
Barnes, Dwight Fletcher, ¹ . . .	Marshfield, . . .	30 North Prospect Street.
Barnes, Fred Leslie, ¹ . . .	Plymouth, . . .	Entomological Building.
Bartlett, Emory Haynes, . . .	Boston, . . .	12 Cottage Street.
Beeler, Leon Charles, ¹ . . .	Adams, . . .	Kappa Gamma Phi.
Betsch, William Carter, ¹ . . .	New York, N. Y., . . .	60 Pleasant Street.
Bisbee, Philip Emerson, ¹ . . .	Waitsfield, Vt., . . .	1 South College.
Bishop, Herbert Walker, ¹ . . .	Doylestown, Pa., . . .	85 Pleasant Street.
Blanpied, Nelson Uhler, . . .	Framingham, . . .	M. A. C. Farm House.
Boyer, Edward Everett Hale, ¹ . . .	Lynn, . . .	8 North Prospect Street.
Brazil, William Henry, . . .	Leominster, . . .	116 Pleasant Street.
Burt, Helen Francis, . . .	West Somerville, . . .	Draper Hall.
Caldwell, Harold Nute, ¹ . . .	Lowell, . . .	M. A. C. Farm House.
Cardarelli, Emilio Joseph, . . .	Boston, . . .	West Experiment Station.
Carver, Frank Whitney, ¹ . . .	Plymouth, . . .	Care of Professor Morton.
Cederstrom, Hjalmar, ² . . .	Dorchester, . . .	-
Chamberlin, Raymond, ¹ . . .	New York, N. Y., . . .	85 Pleasant Street.
Chase, Esther Helen, ¹ . . .	Holden, . . .	Draper Hall.
Chisholm, Raymond Lincoln, . . .	Melrose Highlands, . . .	15 Boston Street.
Clapp, Raymond Luckey, . . .	Northfield, . . .	Care of Mr. Julian.
Clough, Charles Henry, ¹ . . .	Dedham, . . .	15 Boston Street.
Coleman, Albert Sumner, ¹ . . .	Mendon, . . .	82 Pleasant Street.
Coley, William Stanton, ¹ . . .	Wilton, Conn., . . .	87 Pleasant Street.

¹ Work incomplete.² Entered in February, 1913, left September, 1913.

Courchene, Alcide Telesphor, ¹	North Adams,	Kappa Gamma Phi.
Curran, Harry Ambrose,	Marlborough,	Kappa Gamma Phi.
Curtin, Charles Warren,	Auburndale,	36 North Prospect Street.
Cushing, Raymond Alonzo, ¹	Somerville,	13 Phillips Street.
Danforth, George Newlin, ¹	Foxcroft, Me.,	96 Pleasant Street.
Darling, Homer Chester,	Mendon,	9 South College.
Davis, Frank Leslie, ¹	Hopedale,	North Pleasant Street.
Dickinson, William Cows,	North Amherst,	North Amherst.
Dinsmore, Donald Sanderson,	Springfield,	88 Pleasant Street.
Dodge, Walter Eugene,	Geneva, O.,	14 Phillips Street.
Doggett, William Henry,	Dedham,	35 East Pleasant Street.
Duffill, Edward Stanley, ¹	Boston,	8 Allen Street.
Eldredge, Raymond Chase,	North Abington,	30 North Prospect Street.
Estes, Ralph Cary,	South Framingham,	116 Pleasant Street.
Fernald, Charles Henry, 2d,	Amherst,	44 Amity Street.
Fielding, Lester Edward, ¹	Malden,	96 Pleasant Street.
Fisher, George Basil, ¹	Millbury,	88 Pleasant Street.
Gaventa, Harry Reymier,	Swedesboro, N. J.,	Brooks Farm.
Gilmore, Benjamin Anthony, ¹	Acushnet,	40 Amity Street.
Gioiosa, Alfred Anthony,	Dorchester,	8 North College.
Glover, Theodore Whitford, ¹	South Duxbury,	Care of S. J. Wright.
Goodwin, Clinton Foster,	Haverhill,	82 Pleasant Street.
Googins, Burton,	Brooklyn, N. Y.,	96 Pleasant Street.
Gould, Charles Holt,	Worcester,	88 Pleasant Street.
Gunn, Carlton Merrick,	Sunderland,	Beta Kappa Phi.
Hager, Clayton Marden,	Winter Hill,	87 Pleasant Street.
Hall, Stanley William,	Saxonville,	Brooks Farm.
Harris, William Lombard, Jr.,	Deerfield,	53 Lincoln Avenue.
Harrocks, Thomas Lincoln,	Westminster,	21 Fearing Street.
Hart, Reginald,	Montague City,	53 Lincoln Avenue.
Haskell, Frank Eugene,	Northborough,	Mt. Pleasant.
Hathaway, Charles Edward, Jr., ¹	Somerset,	87 Pleasant Street.
Hemenway, Justin Stanley,	Williamsburg,	Brooks Farm.
Hendry, Arthur Ekman, ¹	Milton,	18 Nutting Avenue.
Hicks, Albert James, ¹	Amherst,	Brooks Farm.
Holden, Mae Faustina,	Royalston,	President's House.
Hunt, Reginald Stuart, ¹	Bridgewater,	8 South Prospect Street.
Huntington, Charles Albert, Jr.,	Poquonock, Conn.,	96 Pleasant Street.
Jerome, Frederick William, ¹	Stockbridge,	40 Amity Street.
Jones, Linus Hale, ¹	Milford,	Care of Mr. Green.
Jordan, Perley Black,	Topsfield,	16 South College.
Kelly, Harold Russell, ¹	Haverhill,	11 Gaylord Street.
Kilbon, Ralph Gillette, ¹	Springfield,	Brooks Farm.
King, Edward Lee,	Dorchester,	8 South College.
Knapton, Guy Lord,	Lawrence,	Pease Avenue.
Laird, Kenneth Bradford,	Brockton,	Beta Kappa Phi.
Lamoureux, Domina Joseph, ¹	Adams,	Kappa Gamma Phi.
Lieber, Conrad Hugo,	Jamaica Plain,	Kappa Gamma Phi.
Lindquist, Albert Evert, ¹	Jamaica Plain,	Physics Laboratory.
Little, Harold Greenleaf,	Newburyport,	5 North College.
Locke, Wilbur Trow,	Lawrence,	36 North Prospect Street.
Lyford, Waldo Preston, ¹	Natick,	52 Lincoln Avenue.
Mahan, Harold Butterworth, ¹	Boston,	Kappa Gamma Phi.
Mahony, William John, ¹	Winthrop,	10 South College.
Mason, Julius Stevens, ¹	Hanover, N. H.,	77 Pleasant Street.
Mattoon, Harold Gleason, ¹	Pittsfield,	116 Pleasant Street.
McCulloch, Norman Estes,	Pawtucket, R. I.,	96 Pleasant Street.
Mooney, Raymond Alson, ¹	Plattsburgh, N. Y.,	6 Tilton Court.
Moses, Charles Wicker,	Ticonderoga, N. Y.,	96 Pleasant Street.
Moss, Earle Chester, ¹	Worcester,	83 Pleasant Street.
Mostrom, Harold Augustus,	North Middleborough,	Care of Mr. Watts.
Murphy, John William,	Beverly,	15 Beston Street.

¹ Work incomplete.

Nash, Clayton Wells,	South Weymouth,	5 Sunset Avenue.
Nicholson, James Thomas, ¹	Leominster,	116 Pleasant Street.
Noyes, Samuel Verne,	Georgetown,	Beta Kappa Phi.
O'Brien, Edwin Fulton,	Somerville,	31 North Prospect Street.
Palmer, George Bradford,	Brookline,	96 Pleasant Street.
Pease, Willard Noah Morris, ¹	Amherst,	Brooks Farm.
Perry, Edgar Adams,	Attleborough,	21 Amity Street.
Phelps, Sanford Wallace, Jr., ¹	Turners Falls,	68 Pleasant Street.
Plaisted, Philip,	Arlington,	15 Beston Street.
Potter, David,	Concord,	40 Amity Street.
Pratt, Walter Howard, ¹	Dalton,	M. A. C. Farm House.
Prouty, Stanley Marshall,	North Brookfield,	96 Pleasant Street.
Ray, George Burrill,	Hingham,	Kappa Gamma Phi.
Reed, Andrew John, Jr., ¹	Dalton,	M. A. C. Farm House.
Rich, Gilbert Warren,	Hingham,	Care of Professor Morton.
Richards, Everett Stackpole,	Northampton,	96 Pleasant Street.
Richardson, Lewis Elmer, ¹	Rockville,	42 McClellan Street.
Ricker, Dean Albert,	Worcester,	85 Pleasant Street.
Rogers, Tyler Stewart,	Saxonville,	M. A. C. Farm House.
Rowe, Louis Victor, ¹	Melrose,	18 Nutting Avenue.
Russell, Ernest Samuel, ¹	Hadley,	96 Pleasant Street.
Ryan, William Edward, Jr., ¹	Stoughton,	52 Amity Street.
Sander, Benjamin Charles Louis, ¹	Cambridge,	Brooks Farm.
Sanderson, Everett Shovelton,	Centreville, R. I.,	Nutting Avenue.
Saunders, William Putman,	Lawrence,	116 Pleasant Street.
Sauter, William Hugo, ¹	Turners Falls,	60 Pleasant Street.
Scheufele, Frank Joseph,	South Natick,	15 Beston Street.
Schlotterbeck, Lewis,	Roxbury Station, Conn.,	85 Pleasant Street.
Schwartz, Louis, ¹	Melrose,	West Experiment Station.
Sherinyan, Suran Donald,	Worcester,	35 North Prospect Street.
Simmons, Perez,	Pittsfield,	21 Fearing Street.
Smith, Philip Lawrence, ¹	Kingston,	52 Amity Street.
Stanford, Ernest Elwood,	Amherst,	4 Walnut Street.
Stearns, Frederick Campbell, ¹	Birmingham, Ala.,	40 Amity Street.
Stoughton, Richard, ¹	Montague,	21 Fearing Street.
Strauss, Abraham,	Boston,	101 Pleasant Street.
Swan, Durelle,	Dorchester,	18 Nutting Avenue.
Taber, Ralph Fred,	Cooperstown, N. Y.,	Mt. Pleasant.
Tarbell, Herbert Hitchcock,	Warren,	88 Pleasant Street.
Topham, Alfred,	Lawrence,	116 Pleasant Street.
Upham, Thomas Carlton,	Fitchburg,	53 Lincoln Avenue.
Verbeck, Howard Graves,	Malden,	Care of Mr. Green.
Walkden, Herbert Halden,	Westford,	Brooks Farm.
Walker, Henry Marshall, ¹	Brookline,	Brooks Farm.
Wells, Harry Andrew, ¹	Dalton, Pa.,	75 Pleasant Street.
Wentworth, Everett Lawrence,	East Dover, Vt.,	Wilder Hall.
Wetherbee, Raymond Swift,	Waltham,	Beta Kappa Phi.
Whitney, Harold Tichenor, ¹	Mt. Vernon, N. Y.,	8 North College.
Whitney, Leon Bradley,	Brooklyn, N. Y.,	96 Pleasant Street.
Wies, Calmy, ¹	Malden,	38 Cottage Street.
Wilcox, Timothy Palmer,	Andover,	7 North College.
Wildon, Garrick Earl, ¹	Melrose Highlands,	66 Pleasant Street.
Zehring, Samuel Danford, ¹	Roseville, O.,	120 Pleasant Street.

FRESHMAN CLASS.

Adams, Henry Leo, ¹	Newburyport,	Brooks Farm.
Alcott, William Jefferson, ¹	Everett,	25 Pleasant Street.
Andrews, Robert Morton,	South Carver,	88 Pleasant Street.
Armstrong, James,	North Adams,	-
Avery, Hazelton Small, ¹	San Juan, P. R.,	66 Pleasant Street.
Babcock, Philip Rodney, ¹	Lynn,	75 Pleasant Street.

¹ Work incomplete.

Baer, Richard Moorehead, . . .	Wellesley Farms, . . .	6 Phillips Street.
Barnes, Herbert Wesley, . . .	Whitinsville, . . .	31 North Prospect Street.
Behrend, Oswald, . . .	Natick, . . .	29 McClellan Street.
Bell, Alfred Whitney, Jr., ¹ . . .	West Newton, . . .	40 Amity Street.
Bevan, Kenneth Charles, . . .	Newtonville, . . .	31 East Pleasant Street.
Birchard, John Dickson, . . .	Springfield, . . .	83 Pleasant Street.
Boles, Robert Stewart, ¹ . . .	Dorchester, . . .	67 Pleasant Street.
Bonn, Wesley Copeland, . . .	Grafton, . . .	5 Nutting Avenue.
Booth, Alfred, ¹ . . .	Middletown, N. Y., . . .	Care of Professor Morton.
Borden, Raymond Vincent, ¹ . . .	Fall River, . . .	15 Fearing Street.
Bowen, David Jennings, . . .	North East, Pa., . . .	12 Cottage Street.
Boyce, Harold Prescott, . . .	Haverhill, . . .	7 Nutting Avenue.
Boyd, Robert Lucius, ¹ . . .	Lynn, . . .	Care of E. F. Gaskill.
Brainard, Dwight Gay, ¹ . . .	Dorchester, . . .	35 East Pleasant Street.
Breck, Richard Winslow, ¹ . . .	Boston, . . .	31 East Pleasant Street.
Breckenridge, Earl, . . .	Lynn, . . .	Care of E. F. Gaskill.
Brown, Frederick Ward, ¹ . . .	Scituate, . . .	31 North Prospect Street.
Buchanan, Walter Gray, . . .	Chicopee, . . .	97 Pleasant Street.
Buck, Rollin Hugh, . . .	Worcester, . . .	56 Pleasant Street.
Buckman, Lewis Taylor, . . .	Wilkes-Barre, Pa., . . .	Prospect House.
Burleigh, Arthur Leslie, ¹ . . .	Lynn, . . .	75 Pleasant Street.
Buttrick, Herbert David, . . .	Arlington, . . .	79 Pleasant Street.
Cate, Rex March, . . .	Faneuil, . . .	3 Nutting Avenue.
Chamberlain, Sumner Fiske, ¹ . . .	Holden, . . .	56 Pleasant Street.
Choate, Carlisle Edward, . . .	Frammingham, . . .	53 Lincoln Avenue.
Clark, Walter Thompson, ¹ . . .	Granby, . . .	120 Pleasant Street.
Cotton, Elwyn Page, . . .	Woburn, . . .	81 Pleasant Street.
Cross, Walter Irving, . . .	Hingham, . . .	53 Lincoln Avenue.
Davis, Monsell Henry, . . .	Orange, N. J., . . .	Care of S. J. Wright.
Dawson, Harry Custer, . . .	Tewksbury, . . .	29 North Prospect Street.
Day, James Harold, . . .	Hatfield, . . .	Brooks Farm.
DeMerritt, Franklin, . . .	Watertown, . . .	3 Fearing Street.
DeMott, Harold Edward, ¹ . . .	Brooklyn, N. Y., . . .	50 Lincoln Avenue.
Dempsey, Paul Wheeler, . . .	Dorchester, . . .	53 Lincoln Avenue.
Dick, Robert Edmundston, . . .	Barre, . . .	-
Dickey, Harold Gammell, . . .	Dorchester Center, . . .	18 Nutting Avenue.
Dizer, John Thomas, ¹ . . .	East Weymouth, . . .	35 East Pleasant Street.
Doherty, Paul Edward, ¹ . . .	Fall River, . . .	85 Pleasant Street.
Doll, Otto Henry, ¹ . . .	Adams, . . .	35 East Pleasant Street.
Donovan, Frank Edward, . . .	Turners Falls, . . .	-
Dowd, William Lawrence, . . .	North Amherst, . . .	North Amherst.
Dudley, Lofton Leland, . . .	Long Branch, . . .	36 North Prospect Street.
Dumas, Walter Branca, ¹ . . .	Boston, . . .	35 East Pleasant Street.
Dunham, Henry Gurney, . . .	West Bridgewater, . . .	79 Pleasant Street.
Dunham, Kenneth Herbert, . . .	North Bennington, Vt., . . .	34 North Prospect Street.
Dunn, Arthur Paul, . . .	Malden, . . .	35 East Pleasant Street.
Edwards, Francis Gill, . . .	North Beverly, . . .	13 South College.
Elliot, Ralph William, . . .	Chartley, . . .	12 Cottage Street.
Everbeck, George Charles, ¹ . . .	Winthrop, . . .	25 Pleasant Street.
Farwell, Alfred Austin, . . .	Turners Falls, . . .	79 Pleasant Street.
Favor, Richard William, . . .	Somerville, . . .	29 North Prospect Street.
Fearing, Ralph Watson, ¹ . . .	Dorchester, . . .	7 Nutting Avenue.
Ferris, Adaline Lawson, . . .	Ridgefield Park, N. J., . . .	Draper Hall.
Flagg, Wayne McGrillis, . . .	Mittineague, . . .	116 Pleasant Street.
Flint, Oliver Simeon, . . .	Lowell, . . .	120 Pleasant Street.
Ford, Thomas Henry, ¹ . . .	Medford, . . .	26 High Street.
Francis, Donald Smith, ¹ . . .	Athol, . . .	35 North Prospect Street.
Freeborn, Theodore Merton, ¹ . . .	Fall River, . . .	Brooks Farm.
French, Donald Lee, . . .	Sandwich, . . .	36 North Prospect Street.
Gamage, Carl Everett, ¹ . . .	East Lynn, . . .	75 Pleasant Street.
Gillette, Glenn Councilman, ¹ . . .	Montague, . . .	21 Fearing Street.
Goldstein, Maurice, . . .	Lynn, . . .	41 Pleasant Street.

Graham, Leland Jenkins, . . .	North Amherst, . . .	North Amherst.
Gray, Milton Berford, . . .	Woods Hole, . . .	77 Pleasant Street.
Grayson, Emory Ellsworth, . . .	Milford, . . .	19 Nutting Avenue.
Griswold, Leon Swift, . . .	Wethersfield, Conn., . . .	116 Pleasant Street.
Groff, Howard Clarkson, . . .	Amherst, . . .	197 South Pleasant Street.
Gurshin, Carl Alfred, ¹ . . .	Lynn, . . .	35 North Prospect Street.
Gustetter, Ray Henry, . . .	Hartford, Conn., . . .	14 Nutting Avenue.
Haaren, Paul, . . .	Brooklyn, N. Y., . . .	31 East Pleasant Street.
Haglestein, Charles Henry, ¹ . . .	Dorchester, . . .	66 Pleasant Street.
Hallett, Charles Hiram, . . .	Mansfield, . . .	M. A. C. Farm House.
Harlow, Frank Edward, . . .	Malden, . . .	77 Pleasant Street.
Harlow, Paul Goodhue, . . .	Malden, . . .	77 Pleasant Street.
Harrington, Albert Timothy, ¹ . . .	Lynn, . . .	Care of E. F. Gaskill.
Harris, Warren Timothy, ¹ . . .	Millbury, . . .	Brooks Farm.
Hartford, Claude Ernest, . . .	Townsend, . . .	Brooks Farm.
Hauck, Roland Manss, . . .	Cincinnati, O., . . .	14 Nutting Avenue.
Heffron, Paul John, . . .	Sherborn, . . .	Care of S. J. Wright.
Henderson, Elliott, . . .	Hingham, . . .	35 East Pleasant Street.
Higginbotham, Harry, ¹ . . .	Taunton, . . .	120 Pleasant Street.
Higgins, Gardner William, ¹ . . .	Norfolk, . . .	42 McClellan Street.
Hill, Edmund Baldwin, ¹ . . .	Rutherford, N. J., . . .	3 Nutting Avenue.
Holden, Richard Lynde, . . .	Milford, N. H., . . .	82 Pleasant Street.
Holder, Ralph Clifton, . . .	Millis, . . .	42 McClellan Street.
Holt, Francis Stetham, ¹ . . .	Cambridge, . . .	3 Nutting Avenue.
Hooper, Albert Averill, . . .	Lynn, . . .	75 Pleasant Street.
Hubbell, Franklin Homer, . . .	Westport, Conn., . . .	30 Prospect Street.
Huckins, Warren Israel, ¹ . . .	Sharon, . . .	60 Pleasant Street.
Illman, Margaret Keble, . . .	West Pelham, . . .	West Pelham.
Irving, William Raymond, . . .	Taunton, . . .	120 Pleasant Street.
Jackson, Richmond Merrill, ¹ . . .	Georgetown, . . .	36 North Prospect Street.
Joslyn, Elwyn Duane, . . .	Northfield, Vt., . . .	7 Nutting Avenue.
Kautzenbach, Georg Johannes, ¹ . . .	Somerville, . . .	31 North Prospect Street.
Keegan, Thomas Michael, ¹ . . .	Worcester, . . .	88 Pleasant Street.
Kelsey, Lincoln David, . . .	West Hartford, Conn., . . .	12 Cottage Street.
Kinsman, Alfred Oberlin, Jr., . . .	Merrimac, . . .	46 McClellan Street.
Lancey, Clifford Scales, . . .	Townsend, . . .	79 Pleasant Street.
Landers, Giles Ezra, . . .	Cataumet, . . .	81 Pleasant Street.
Larson, Frederick Christian, . . .	Everett, . . .	26 High Street.
Latham, Paul Walker, . . .	Norwich Town, Conn., . . .	66 Pleasant Street.
Lawrence, Milford Robinson, . . .	Falmouth, . . .	83 Pleasant Street.
Leigh, James Alfred, ¹ . . .	Worcester, . . .	3 Nutting Avenue.
Little, Louis, . . .	Leominster, . . .	-
Livermore, William Tingley, . . .	Lawrence, . . .	77 Pleasant Street.
Loring, Albert, . . .	Hull, . . .	53 Lincoln Avenue.
Lydiard, Harry Crowther, . . .	Hartford, Conn., . . .	3 Nutting Avenue.
Mack, Walter Adams, . . .	Springfield, . . .	15 Phillips Street.
MacLeod, Daniel Johnson, ¹ . . .	Wakefield, . . .	Brooks Farm.
MacNaught, Warren Henry, . . .	Plymouth, . . .	Corner of Hallock and North Prospect streets.
Mars, Malcolm Rowe, . . .	Walpole, . . .	56 Pleasant Street.
Martel, John Edward, . . .	Turners Falls, . . .	29 McClellan Street.
Mather, Fred, . . .	Taunton, . . .	Brooks Farm.
Maurer, Erwin Emil, . . .	Yonkers, N. Y., . . .	12 Cottage Street.
Mayo, Frank Willard, . . .	Houlton, Me., . . .	120 Pleasant Street.
Mayo, William Irving, Jr., . . .	Framingham Center, . . .	M. A. C. Farm House.
McGuire, Raymond Thomas, ¹ . . .	Worcester, . . .	17 Fearing Street.
McRae, Herbert Rankin, . . .	Malden, . . .	13 Fearing Street.
Merrill, Dana Otis, ¹ . . .	Pepperell, . . .	6 Phillips Street.
Moorhouse, Newell, . . .	Worcester, . . .	17 Fearing Street.
Nash, Herman Beaman, . . .	North Hadley, . . .	Amherst.
Nason, Leonard Hastings, ¹ . . .	Auburndale, . . .	Brooks Farm.
Nath, Morris, ¹ . . .	Dorchester, . . .	41 Pleasant Street.

¹ Work incomplete.

Nelson, John Brockway, ¹	Newburyport,	Brooks Farm.
Nestle, William John,	Amherst,	32 Whitney Street.
Nims, Homer Willis, ¹	Montague,	21 Fearing Street.
Noyes, John Walker, ¹	Chelsea,	35 North Prospect Street.
Oertel, August Leonard,	South Hadley Falls,	Amherst.
Oliver, George Taylor, Jr., ¹	Everett,	84 Pleasant Street.
Pareis, Egbert Leigh,	Elizabeth, N. J.,	66 Pleasant Street.
Patton, Willard Ginn, ¹	South Framingham,	M. A. C. Farm House.
Petit, Arthur Victor, ¹	Amherst,	31 East Pleasant Street.
Picard, Louis Francis, ¹	Hadley,	Hadley.
Pickard, Walter Douglas,	Hopedale,	77 Pleasant Street.
Pierce, Harold Barnard,	Kansas City, Mo.,	Corner Fearing and Pleasant streets.
Pike, Chester Arthur, ¹	Smith's,	24 Beston Street.
Poland, Robert Rantoul, ¹	West Acton,	24 Beston Street.
Porter, Wayland Robinson,	Amherst,	Amherst.
Pratt, Harold Arthur,	Shrewsbury,	Care of Professor Morton.
Purtle, William Edward, ¹	Monticello, Ky.,	6 Allen Street.
Pyne, Roger Sorenson, ¹	Springfield,	15 Phillips Street.
Quimby, Charles Frederick,	Cape Neddick, Me.,	35 East Pleasant Street.
Randall, Earle MacNeill,	Somerville,	44 Pleasant Street.
Ratner, Charles Cosrael, ¹	Springfield,	58 Pleasant Street.
Ritter, Ernest,	New Britain, Conn.,	120 Pleasant Street.
Rodger, Raymond Miller,	Everett,	9 Fearing Street.
Rorstrom, Hans Alfred, ¹	Boston,	Brooks Farm.
Rosequist, Birger Reignold, ¹	Brockton,	18 Nutting Avenue.
Ross, Louis Warren,	Arlington,	79 Pleasant Street.
Ruppell, Arthur Daniel, ¹	Lynn,	Care of E. F. Gaskill.
Rutter, Walter Frederick, ¹	Lawrence,	15 Fearing Street.
Saidel, Harry Samuel,	Worcester,	3 Nutting Avenue.
Sargent, George Leonard,	Merrimac,	46 McClellan Street.
Saville, William, Jr.,	Waban,	40 Amy Street.
Schaefer, Leonard Charles, ¹	Somerville,	36 North Prospect Street.
Schur, Arthur Leon,	Boston,	7 Nutting Avenue.
Schwab, Andrew Nathan, ¹	Yalesville, Conn.,	81 Pleasant Street.
Scott, George Alvin, ¹	Clinton,	36 North Prospect Street.
Seavey, Marden Homer, ¹	Westford,	Brooks Farm.
Sevrens, Linton Garfield, ¹	Medway,	-
Shumway, Paul Edward, ¹	Greenfield,	60 Pleasant Street.
Simons, Clifton Harbough, ¹	Newton Center,	3 McClellan Street.
Sims, James Stanley,	Melrose,	13 Phillips Street.
Smith, Herbert Dwight, ¹	Poughkeepsie, N. Y.,	Care of S. J. Wright.
Smith, Hayden Henkel,	Springfield,	15 Phillips Street.
Smith, Richard Woodworth,	Pittsfield,	84 Pleasant Street.
Spaulding, Almon Whitney,	Dorchester,	18 Nutting Avenue.
Squires, Paul Revere, ¹	Belchertown,	Belchertown.
Stackpole, Frank Charles, ¹	Somerville,	18 Nutting Avenue.
Stearns, Carlton McIntyre, ¹	Melrose,	13 Phillips Street.
Stempler, Morris, ¹	Boston,	41 East Pleasant Street.
Stiles, Albert Ralph,	Arlington Heights,	36 North Prospect Street.
Stjernlof, Axel Uno,	Worcester,	Brooks Farm.
Stowell, Harold Thurber, ¹	Amherst,	193 South Pleasant Street.
Strong, William Andrew,	New York, N. Y.,	10 South College.
Sturtevant, Warren Butterfield,	Springfield,	83 North Pleasant Street.
Swett, Francis Stuart,	Southbridge,	116 Pleasant Street.
Swift, Raymond Walker,	North Amherst,	North Amherst.
Terrill, Herbert William,	Ansonia, Conn.,	North Pleasant Street.
Tucker, Arthur Currie, Jr., ¹	Nyack, N. Y.,	81 Pleasant Street.
Tucker, Lee Heston,	Ware,	120 Pleasant Street.
Turner, Willis,	North Reading,	35 North Prospect Street.
Tuthill, Samuel Fuller,	Mattapoisett,	31 East Pleasant Street.
Upson, Everett Langdon, ¹	New Britain, Conn.,	Care of Professor Sears.

Walbridge, Henry Blood, . . .	Bennington, Vt., . . .	32 North Prospect Street.
Warner, Merrill Pomeroy, . . .	Sunderland, . . .	5 Nutting Avenue.
Warren, Harold Manson, . . .	Melrose, . . .	5 McClellan Street.
Warren, James Joseph, . . .	North Brookfield, . . .	35 North Prospect Street.
Westman, Robert Clayton, ¹ . . .	Roslindale, . . .	Brooks Farm.
Wheeler, Chester Warren, . . .	Southborough, . . .	88 Pleasant Street.
Whitcomb, Warren Draper, ¹ . . .	Waltham, . . .	120 Pleasant Street.
White, J. Edward Walbridge, ¹ . . .	North Bennington, Vt., . . .	32 North Prospect Street.
Whitney, Joseph Fradley, . . .	Brooklyn, N. Y., . . .	52 Lincoln Avenue.
Wilber, Charles Raymond, . . .	Walpole, . . .	56 Pleasant Street.
Williams, Arthur Franklin, . . .	Sunderland, . . .	5 Nutting Avenue.
Williams, Herbert Clifton, . . .	South Hadley Falls, . . .	Care of Dr. Clark.

UNCLASSIFIED STUDENTS.

Burkes, Harold James, . . .	Waltham, . . .	15 Phillips Street.
Comeau, Mark Walter, . . .	Maynard, . . .	75 Pleasant Street.
Dodd, Dexter Tiffany, . . .	Chestnut Hill, . . .	83 Pleasant Street.
Fellows, Katharine Adelheid, . . .	Northampton, . . .	38 Paradise Road, North- ampton.
Fiske, Howard Benjamin, . . .	Passaic, N. J., . . .	Care of C. W. Marshall.
Hamlin, Margaret Ruth Pomeroy, . . .	Easthampton, . . .	3 Fearing Street.
Healy, James John, . . .	Florence, . . .	35 North Prospect Street.
Hunnewell, Paul Fiske, . . .	West Somerville, . . .	13 Phillips Street.
Kelsey, Edmund Dean, . . .	Cambridge, . . .	79 Pleasant Street.
Kerr, Tracy, . . .	Springfield, . . .	Brooks Farm.
Lindsley, Horace Nelson, . . .	Orange, N. J., . . .	83 Pleasant Street.
MooradKanian, Gregory, . . .	Lawrence, . . .	Hillside Avenue.
Morton, Leander Paul, . . .	Amherst, . . .	Care of Professor Morton.
Newton, Raymond Lovejoy, . . .	Malden, . . .	3 Nutting Avenue.
Putney, Roy Luther, . . .	East Lynn, . . .	Care of E. F. Gaskill.
Rossell, Irving Rowland, . . .	Rahway, N. J., . . .	29 McClellan Street.
Stranahan, Mrs. Grace E., . . .	Montclair, N. J., . . .	Northampton.
Studley, Robert Allan, . . .	Newton Highlands, Rock- land.	44 Triangle Street.
Swofford, Lindsey, . . .	Mt. Mitchell, N. C., . . .	—
Talbot, Marjorie, . . .	Roxbury, . . .	Draper Hall.
Upham, Harland Willis, . . .	Thornton's Ferry, N. H., . . .	8 Allen Street.
Watson, LeRoy Prouty, . . .	Spencer, . . .	66 Pleasant Street.
Willard, Harold Nelson, . . .	Baltimore, Md., . . .	Care of Mr. Julian.
Winter, Henry George, . . .	Ashburnham, . . .	Care of E. F. Gaskill.

SUMMARY BY CLASSES.

Graduate students,	40
Senior class,	98
Junior class,	103
Sophomore class,	140
Freshman class,	202
Unclassified students,	24
Total registration,	607

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Massachusetts,	499
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Connecticut,	24
New Jersey,	11
Vermont,	7
New Hampshire,	6
Pennsylvania,	6

¹ Work incomplete.

Rhode Island,	3
Ohio,	3
Maine,	3
Wisconsin,	2
Alabama,	1
Barbados,	1
Canada,	1
Colombia, S. A.,	1
Illinois,	1
Japan,	1
Kentucky,	1
Maryland,	1
Michigan,	1
Missouri,	1
Nebraska,	1
North Carolina,	1
Porto Rico,	1
Turkey,	1
Virginia,	1
Total,	607

SHORT COURSES — 1913.

WINTER SCHOOL — 1913.

Abbot, Francis A.,	Harvard.
Abbot, Mary Perkins,	Harvard.
Allen, John S.,	Roxbury Crossing, 24 Edge Hill Street.
Angier, Henry,	Amherst.
Babbitt, Howard S.,	Chicopee, 340 Grove Street.
Bacon, Ralph D.,	Worcester, 401 Chandler Street.
Barker, Bowen,	Groton.
Barnes, Joseph C.,	Lanesborough.
Bartlett, C. S.,	Lowell, Hood Farm.
Barton, Charles E.,	Wilmington.
Bartow, Lathrop,	New York City, 33 West 73d Street.
Beals, Harry W.,	Plainfield.
Bean, Arthur H.,	Florence, 173 Spring Street.
Bickford, A. O.,	Hubbardston.
Bittinger, Fritz John,	Plymouth.
Borden, Aubrey W., ¹	South Framingham.
Bridgman, Federal B.,	Northampton.
Bridgman, Gertrude L., ¹	South Amherst.
Budd, Roger,	Holyoke, 7 Nonotuck Street.
Butterfield, L.,	Lexington.
Cady, C. M.,	Amherst.
Candage, Uziel F.,	Norfolk, Avery Street.
Cannon, T. Vincent, ¹	-
Carleton, Boyd,	Boston, 170 Summer Street.
Cathie, Harold Gordon,	Needham, Pleasant Street.
Chambers, Maude B.,	Amherst, 8 Allen Street.
Chase, Newell D.,	Walbrook, Md.
Clapp, Roger W.,	Westhampton.
Clark, Leonard T.,	Wethersfield, Conn.
Coffin, Robert L.,	Amherst.
Cotter, William F.,	Salem, 25 Aborn Street.
Creesuy, Richard Lincoln,	Brookline, 48 Harris Street.
Crosby, Stanley W.,	Warren.
Darling, Ada Braun,	Greenfield.
Davis, Patrick,	Chestnut Hill, 40 Orchard Road.
Davis, Walter H.,	Amherst, R. F. D.
Day, Albert L.,	Graniteville.
Day, Don L.,	Cyrus.
Day, D. Percy,	West Kennebunk, Me.
Day, George Clarence, ¹	West Kennebunk, Me.
Dayton, Fred A.,	Springfield, 207 Bay Street.
Delano, Kenneth H.,	Boston.
Dickinson, Richard L.,	Sunderland.
Dole, Fred B.,	Shelburne.
Doran, Ralph C., ¹	North Dartmouth.
Drake, Gilbert H.,	North Bellingham.
Dunbar, Guy C.,	Chestnut Hill, South Street.
Estabrook, O. B.,	Hopedale.
Evans, John M.,	Northampton, 21 Summer Street.
Fenn, Fred S., ¹	Westminster, Vt.
Fiebigler, P.,	Granby.

¹ Withdrawn. Fee refunded on account of scarlet-fever epidemic.

Fisher, Mrs. Ellen N.,	Boston, 1359 Commonwealth Avenue.
Flint, Orville J.,	Westhampton.
Foley, Fred F.,	Fitchburg.
Francis, Benjamin A.,	Rock.
Fuller, Leroy D.,	Granby.
Goodrich, Mary E.,	Needham.
Greenwood, Laurence J.,	Billerica, Dudley Street.
Guild, Sydney T.,	Medford, 31 College Avenue.
Gummow, Earl R.,	Halifax.
Hannigan, William E.,	West Fitchburg, 171 Depot Street.
Harris, Myron A.,	Farmington.
Hepburn, Philip S.,	Sunderland.
Higgins, Edward L.,	North Billerica.
Hobart, Clarence A., ¹	North Amherst.
Howells, Daniel W.,	179 Summit Avenue, Upper Montclair, N. J.
Ingalls, O. D.,	99 South Fullerton Street, Montclair, N. J.
Jackson, Charles A.,	Unadilla, N. Y.
Jenks, E. Lawrence,	Kensington, Conn.
Keefe, Mrs. Daniel F.,	Ipswich.
Keyes, F. Grant,	Bryantville.
Kilbourn, Walter G., ¹	South Lancaster.
Kohl, Philip William,	Franklin, Lincoln Street.
Kress, Paul E.,	Hingham Center, Box 33.
Leavitt, Arthur W.,	Roslindale.
Lent, Paul H.,	Worcester.
Lerner, Rose S.,	Millis.
Lincoln, Jerome W.,	Taunton.
Lyman, C. E., ¹	South Hadley.
Lyman, Frederick C.,	Amherst.
McGarry, Virginia,	Grafton, South Street.
McIntosh, Allan,	Needham, Great Plain Avenue.
Mason, Carrie L.,	Winchester, 31 Vine Street.
Meurisse, John,	Monson, R. F. D. No. 2.
Miller, Arthur L.,	Westborough.
Millett, Leon E.,	Whitman, Station A.
Moller, Martin T.,	Bridgeport, Conn.
Moore, A. S.,	Northampton.
Morton, Leander P.,	Amherst.
Moynahan, Felix,	Chicopee.
Murtaugh, Joseph P.,	Auburndale.
Nixon, William J.,	Roxbury, 36 Woodcliff Street.
Noonan, D. A.,	South Boston.
Nyce, Jonas W., ¹	Sonderton, Pa., 114 Chestnut Street.
O'Rourke, John,	New Bedford.
Otis, W. H.,	Fitchburg.
Paley, Israel,	Colchester, Conn.
Paulson, Joseph W.,	Milton.
Pease, Harold M.,	Chester, R. F. D., No. 2.
Perley, Raymond,	Georgetown.
Perry, Roger Newton,	Worcester, 82 Park Avenue.
Pierce, Fred W.,	Wrentham, East Street.
Poor, Ben Perley,	North Andover, 341 Sutton Street.
Porter, William D.,	Holliston, R. F. D., No. 10.
Pratt, Anson M.,	Pownal, Vt.
Priest, Harold A.,	Gleasondale.
Prout, Norman W.,	Grafton.
Quinn, Joseph A.,	Amherst.
Rich, Alton F.,	Winthrop.
Robinson, H. V.,	Medford, 69 Summer Street.
Robsham, Rolf V.,	Northampton, 490 Elm Street.

¹ Withdrawn. Fee refunded on account of scarlet-fever epidemic.

Roe, Harold B.,	East Windsor, Conn.
Rothwell, Mrs. Bernard J.,	Needham.
Ross, Evan A.,	Northampton, 490-Elm Street.
St. Amand, Joseph F.,	Salem.
Scholz, Paul A.,	Adams.
Schwarz, Miss Julia,	Sharon.
Shannon, Arthur L.,	Millis, Exchange Street.
Sharkey, John E.,	Sunderland.
Sherwood, Grover,	Chester, R. F. D. No. 2.
Shipman, Raymond D., ¹	South Hadley, R. F. D.
Simes, Louis,	Boston, 5 Tileston Street.
Smith, Harold,	Avon, Box 202.
Smith, Harry,	Revere, 99 Bellingham Avenue.
Smith, Linn A.,	Unadilla, N. Y.
Smith, L. Edmund,	West Brookfield.
Spencer, J. Arthur,	Milton.
Steacie, Edward, Jr.,	Dorchester, 37 Bloomfield Street.
Talmage, Frank M.,	Great Barrington.
Taylor, Frank R.,	Frye, Me.
Taylor, Dr. Frederick Leon,	Natick, Forest Avenue.
Thompson, Charles Bush,	Dover.
Thompson, Ralph M.,	Winchester.
Tomlinson, Bertram,	Northampton, 25 James Avenue.
Tracy, Alfred E., ¹	South Boston, 504 Sixth Street.
Truesdell, Clarence E.,	Zoar.
Turner, Ralph C.,	Upham's Corner, 54 Grampian Way.
Twombly, Harry,	New London, N. H.
Vincent, T. Lawrence,	Torrington, Conn., R. F. D.
Wald, B. F.,	Amherst, 61 Amity Street.
Warner, J. H.,	Sunderland.
Wetherbee, Dwight E.,	Amherst.
White, Alfred Baylies,	Taunton, 120 High Street.
Whiting, Charles Theodore,	Greenfield.
Whitlock, Aaron A.,	Warehouse Point, Conn.
Whittaker, Clifford F.,	Taunton.
Wilbur, Woodward Arthur,	Lanesborough, Lincoln Street.
Wildes, Theo. B.,	Boston, 31 Marlborough Street.
Williams, Alexander,	Boston, Hotel Charlesgate.
Willet, George B.,	Dracut.
Wolschendorf, George E.,	Whitman.
Woodman, Rodney Canfield,	Milford, 12 Amherst Street.
Young, Harold B.,	Yalesville, Conn.
Zappey, J. Frederick,	West Wrentham.

STUDENTS IN APPLE-PACKING SCHOOL, JAN. 23-29, 1913.

Barker, Bowen,	Groton.
Brooks, George A.,	Boston, 18 Derne Street.
Bruner, Myron L.,	Wilbraham.
Byrne, Edward J.,	Ardmore.
Capen, Samuel H.,	Dedham.
Davis, W. M.,	Boston, 93 Beach Street.
Emerson, W. K.,	Concord Junction.
Foster, H. K.,	Ashby.
Guild, S. T.,	Medford, 31 College Avenue.
Hall, Russell B.,	Amherst.
Jenks, L. P.,	Williamstown.
Laboutely, G. E.,	Belchertown.
Lerner, Rose,	Peru.
Mason, O. N.,	Wrentham.
Moran, T. H.,	Jericho, Vt.
Nyce, Jonas W.,	Sonderton, Pa., 114 Chestnut Street.

¹ Withdrawn. Fee refunded on account of scarlet-fever epidemic.

Parsons, Wilfred A.,	Southampton,
Paul, Eleanor Frances,	Sherborn.
Reid, John,	Woronoco.
Sampson, S. D.,	M. A. C., 1913.
Searle, Edward C.,	Southampton,
Snyder, Henry H.,	Cummington.
Watson, Ralph C.,	South Freeport, Me.
Wood, Burt F.,	Athol.
Wooding, E. M.,	Clintonville, Conn.

SCHOOL FOR TREE WARDENS, 1913.

Abbe, F. H.,	Boston.
Bailey, L. S.,	Middleborough.
Bailey, Mrs. L. S.,	Middleborough.
Ball, L. P.,	Winchendon.
Bean, Minot A.,	Chelmsford.
Bemis, E. L.,	Brookfield.
Bragg, J. W.,	Greenfield.
Bray, Thomas A.,	Holyoke, 19 Laurel Street.
Breed, Edward W.,	Clinton.
Brown, Percival S.,	Scituate.
Burns, Wm. G.,	Greenfield.
Callahan, James F.,	Peabody.
Campbell, Wm. A.,	Greenfield.
Carrick, Thomas F.,	Draout, R. F. D.
Cutter, H. A.,	Bedford.
Davis, J. Alden,	Springfield.
Dodge, A. W., Jr.,	Reading.
Eastman, Geo. F.,	Granby.
Field, A. F.,	Hillsborough.
Gay, E. F.,	Norwood.
Gaylord, R. S.,	Hadley.
Guptill, Melvin,	Boston, 49 North Washington Street.
Haskell, T. P.,	Northborough.
McLaughlin, J. H.,	Millers Falls.
Mills, D. C.,	Fitchburg.
Moore, C. A.,	Westfield.
Neale, Harold J.,	Worcester.
O'Brien, Wm. H.,	North Billerica.
Pierpont, John E.,	Williamsburg.
Peeso, J. A.,	Belchertown.
Phillips, Albert A.,	Greenfield.
Rane, F. W.,	Boston.
Reynolds, Harriet,	Boston, 4 Joy Street.
Ruch, C. N.,	Granby.
Sautelle, B. A.,	Greenwich.
Shaw, Frank H.,	Rockland.
Southard, F. D.,	Milton.
Symmes, Samuel S.,	Winchester.
Wilkins, Geo. S.,	Carlisle.
Whitaker, C. L.,	New York City, 470 4th Avenue.
Whitney, Geo. A.,	Athol.
Woolthly, L. H.,	Boston.
Zeissig, S. E.,	Ware.

BEE COURSE, 1913.

Baker, H. Raymond,	Amherst.
Dickens, Gustav,	Cheshire, Conn.
Haynes, Edgar G.,	Suffield, Conn.
Lord, Carey Stevens,	Richmond.
Loverin, Harriet,	Shelton, Conn.
Robinson, Lucy M.,	Waltham.

STUDENTS OF THE SUMMER SCHOOL, 1913.

Adams, Mabelle,	97 Paradise Road,	Swampscott.
Alden, Marie P.,	365 Hancock Street,	Brooklyn, N. Y.
Allen, H. C.,	—	Phoenix, Ariz.
Anderson, Sheed,	497 Warren Street,	Roxbury.
Bachelder, Grace,	9 St. James Avenue,	Boston.
Banning, Laura,	242 South 4th Avenue,	Mt. Vernon, N. Y.
Bantle, Ida E.,	—	Amherst.
Barker, Luliona,	—	Amherst.
Batchelder, Isabel,	Hillside Street,	Amesbury.
Bill, Mrs. Mary E.,	58 Prospect Street,	Waltham.
Blackmer, Nellie E.,	106 Euclid Avenue,	Springfield.
Bousfield, Mary,	1 Whiteley Street,	North Adams.
Briggs, Rose,	R. F. D.,	Bourndale.
Britton, Harriet W.,	47 Farmington Avenue,	Hartford, Conn.
Brockway, Clarence A.,	31 Hancock Street,	West Springfield.
Brooks, Laura J.,	31 Stevens Street,	Stoneham.
Brooks, Laura L.,	62 Chestnut Street,	Gardner.
Brown, H. Whittemore,	Elm Street,	Concord.
Brown, Marion S.,	946 Central Avenue,	Plainfield, N. J.
Brown, Percy M.,	946 Central Avenue,	Plainfield, N. J.
Brown, Susie,	—	Amherst.
Brownell, Harriet M.,	—	Bryn Mawr, Pa.
Bryant, Bertha W.,	Rest Hill,	Woburn.
Burnap, Margaret,	Rest Hill,	Woburn.
Capen, Arthur C.,	—	Worthington.
Chamberlin, Mrs. Edwin,	2 Avon Street,	Cambridge.
Chamberlin, Edwin,	2 Avon Street,	Cambridge.
Clapp, Harriet A.,	9 Rockledge Place,	Yonkers, N. Y.
Clark, Mrs. R. F.,	42 West 35th Street,	New York, N. Y.
Clark, Ruth,	10 Hallock Street,	Amherst.
Clark, Katherine,	—	North Amherst.
Cornell, Edward B.,	—	Haverhill, N. H.
Crew, Caroline L.,	903 Tatnall Street,	Wilmington, Del.
Darrow, W. H.,	16 Bennock Street,	Orono, Me.
Davis, Irving L.,	—	Brimfield.
Davis, Emma A.,	60 High Street,	Medford.
Dean, Lucy,	416 Marlborough Street,	Boston.
Douglas, Nan,	South Main Street,	Great Barrington.
Dowe, Amy H.,	50 Summer Street,	Norwich, Conn.
Drake, Mary A.,	53 Institute Road,	Worcester.
Eastman, Dora W.,	United States Indian School,	Genoa, Neb.
Eastwood, Wm.,	507 Beacon Street,	Boston.
Emerson, Marguerite,	395 Broadway,	Cambridge.
Felton, F. Ethel,	9 Phillips Street,	Amherst.
Fimiss, Mrs. M. A.,	57 High Street,	Medford.
Flagg, Sadie E.,	—	West Berlin.
Frost, Mildred N.,	106 Pleasant Street,	Newton Center.
Glazier, Leta M.,	—	Amherst.
Goodnow, Edna M.,	—	Amherst.
Hall, Florence J.,	—	Waltham.
Hall, Ida E.,	—	Waltham.
Harris, Jessie F.,	9 Silver Street,	Worcester.
Hunck, Walter L.,	3114 West 8th Street,	Cincinnati, O.
Hunck, Roland M.,	3114 West 8th Street,	Cincinnati, O.
Hayward, Marguerite,	8 Dana Street,	Cambridge.
Hewins, Alfred S.,	Maple Place,	Dedham.
Holden, Clara B.,	19 Avon Street,	Melrose.
Hooker, Bessie M.,	5 North East Street,	Amherst.
Howard, Clara,	—	North Amherst.
Howe, Florence I.,	28 Myrtle Street,	Leominster.
Howlett, Cora M.,	—	South Amherst.

Hoyt, Laura A.,	68 Federal Street,	Greenfield.
Hurlin, Edna M.,	77 Mayfield Street,	Boston.
James, J. E.,	446 Marlborough Street,	Boston.
Janvier, Margaret R.,	-	Lansdowne, Pa.
Johnson, Roscoe E.,	14 Roberts Hall,	Waterville, Me.
Kellogg, Ella,	-	North Amherst.
Kennedy, Anna,	30 Park Avenue,	South Weymouth.
Kezar, Myrtle E.,	-	Belchertown.
Knowles, Grace,	1 Roxbury Avenue,	Natick.
Lane, Madeline H.,	-	Great Barrington.
Lawrence, N. Louise,	425 Marlborough Street,	Boston.
McBurney, Henry,	35 Lincoln Avenue,	Amherst.
MacDonald, Ruby,	456 Centre Street,	Jamaica Plain.
Marble, Mrs. W. Cary,	1970 Morgan Avenue,	Hollywood, Cal.
Marsh, Ida M.,	The Capitol,	Albany, N. Y.
Maynard, Pearl A.,	447 Crafts Street,	West Newton.
Mead, S. Gordon,	Lake Waranaug,	New Preston, Conn.
Milligan, Lester O.,	Box 186,	Dalton.
Mills, Mabelle L.,	-	Amherst.
Nestle, Grace,	-	Amherst.
O'Hern, Elizabeth V.,	85 Furnace Street,	North Adams.
Parsons, Elsie J.,	11 School Street,	Adams.
Pease, Willard,	Pleasant Street,	Amherst.
Perry, Gerald,	17 Amity Street,	Amherst.
Pettis, Sybil,	-	Thompson, Conn.
Phillips, Arthur W.,	10 Prospect Hill,	Somerville.
Phillips, Ralph O.,	10 Prospect Hill,	Somerville.
Platt, Mrs. Royal T.,	Laconic Avenue,	Great Barrington.
Porter, Grace,	Perkins Institute,	Watertown.
Pulsifer, Woodbury,	-	Washington, D. C.
Putnam, Charles S.,	Care of A. E. Sargent,	R.F.D. Groton.
Raker, Helen S.,	39 Magazine Street,	Cambridge.
Reidy, Lillian C.,	169 East 90th Street,	New York, N. Y.
Richards, Clinton J.,	22 Prospect Avenue,	Northampton.
Robinson, Dr. Mary B.,	30 Harris Street,	Waltham.
Rowell, Allice M.,	-	Tilton, N. H.
Sanborn, Arthur,	183 Central Street,	Winter Hill.
Scheuele, J. A.,	Hampt. County Imp.,	Springfield.
Seaver, Myrtle B.,	-	Williamstown.
Severance, Caroline,	-	Amherst.
Shumway, Ruth,	-	Amherst.
Small, Lucy B.,	-	North Truro.
Smith, Abbie M.,	-	Salisbury.
Spaulding, Lyford P.,	23 Waltham Street,	Lexington.
Spear, Harriet,	-	North Amherst.
Stebbins, Dorothea,	405 Marlborough Street,	Boston.
Steinhauer, E. K.,	-	Rome, N. Y.
Stewart, Isabel A.,	161 West 14th Street,	New York City.
Thorpe, Willis E.,	8 Ash Street,	Danvers.
Thurston, Grace R.,	111 Gainsboro Street,	Boston.
Thyng, Mary E.,	19 Cherry Street,	Lynn.
Upham, Harlan W.,	-	Thornton's Ferry, N. H.
Vietz, Paul W.,	-	West Acton.
Walker, Geo. J.,	-	Lexington.
Webb, D. Frances,	9 Phillips Street,	Amherst.
Weeks, Gertrude,	25 Peterborough Street,	Boston.
Welch, Anna G.,	32 Fenwick Street,	Somerville.
Whitcomb, Ralph,	-	Amherst.
White, Jr., Robert,	1039 Massachusetts Avenue,	Cambridge.
Wight, Mrs. Charles L.,	-	Honolulu, Hawaii.
Winslow, Alice V.,	Normal Hall,	Framingham.
Winslow, Isabelle F.,	257 Steuben Street,	Brooklyn, N. Y.
York, Mrs. Olla A.,	2 Fearing Street,	Amherst.

Greene, Mrs. Anna A.,	.	.	.	-	-	Cotuit.
Morton, Charlotte,	.	.	.	-	-	Amherst.
Nickerson, Mrs. C. E.,	.	.	.	-	-	Amherst.

SCHOOL FOR RURAL SOCIAL WORKERS, 1913.

Guptill, Roger S.,	.	.	.	-	-	Kingston, N. H.
Jobbins, Rev. E. W.,	.	.	.	Granby Road,	.	Southwick.
Kebbe, David L.,	.	.	.	-	-	Cummington.
Klinck, L. S.,	.	.	.	MacDonald College,	.	Quebec, Can.
Panunzio, C. M.,	.	.	.	Box 547,	.	Amherst.
Patt, Hermann G.,	.	.	.	-	-	Granville.

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THE M. A. C. BULLETIN

AMHERST, MASS.

Vol. VI. No. 2

February, 1914.

Published Six Times a Year by the College.

Jan., Feb., Mar., May, Sept., Oct.

ENTERED AS SECOND-CLASS MATTER AT THE POST OFFICE, AMHERST, MASS.

Public Document

No. 31

FIFTY-FIRST ANNUAL REPORT

OF THE

MASSACHUSETTS AGRICULTURAL COLLEGE.

PART I.

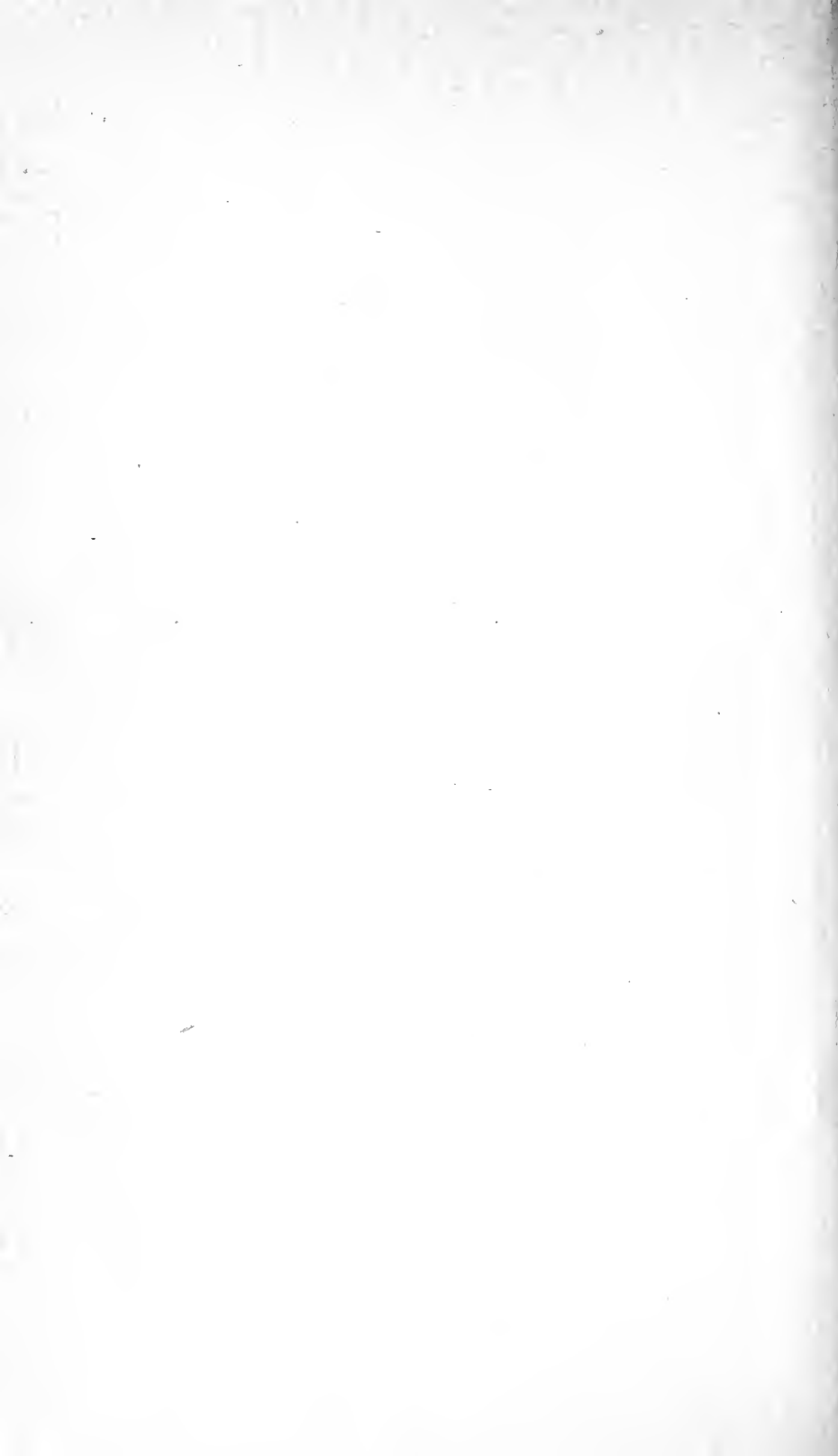
REPORT OF THE PRESIDENT AND OTHER OFFICERS

FOR FISCAL YEAR ENDED NOV. 29, 1913.



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APPROVED BY
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The Commonwealth of Massachusetts.

MASSACHUSETTS AGRICULTURAL COLLEGE,
AMHERST, Dec. 2, 1913.

To His Excellency EUGENE N. FOSS.

SIR: — On behalf of the trustees of the Massachusetts Agricultural College I have the honor to transmit herewith, to Your Excellency and the Honorable Council, Part I. of the fifty-first annual report of the trustees, for the fiscal year ended Nov. 29, 1913, this being the report of the president and other officers of the college to the corporation.

I am, very respectfully, your obedient servant,

EDWARD M. LEWIS,
Acting President.

REPORT OF THE PRESIDENT OF THE COLLEGE.

Gentlemen of the Corporation.

Owing to the absence of President Butterfield, and to the honor conferred upon me by your honorable body, it becomes my duty to present to you the annual report of the Massachusetts Agricultural College for the year ended Nov. 29, 1913. This I herewith submit.

A REVIEW OF THE YEAR.

ATTENDANCE.

The number of students enrolled in the four-year course this year is 542. In addition there are 24 registered as unclassified students and 39 as members of the graduate school. The increase over last year in attendance of regular four-year students is 40, or 8 per cent.; the total enrollment of students doing work of college grade is 605, an increase of 50 over the total enrollment of last year. The entering class numbers 201, this number being larger by 17 than the entering class of 1912. (See Table I.¹)

Eighty-two per cent. of the freshman class come from Massachusetts; 10 other States are represented. In spite of the fact that in 1912 a tuition fee was charged to students entering from States other than Massachusetts, the number of non-residents has in both years slightly increased. All counties in Massachusetts, with the exception of Dukes and Nantucket, are represented in the class; Middlesex County again this year sends the largest number, its proportion being slightly over one-fourth, Worcester County is second, and Essex County third. (See Table V.)

While one-sixth of the class are undecided as to their in-

¹ The following statistics and tables are found at the end of this report: attendance, legislative budget, statistics of the extension service, public speakers for the year, statistics of freshmen, entrance statistics of the freshman class, and changes in personnel of officers of the institution.

tended vocation, I am glad to say that over 80 per cent. of the entire class signify their intention of following some form of agriculture or horticulture. Over 94 per cent. of those who have stated their choice of a vocation intend to follow some branch of agriculture. Twenty per cent. of the fathers of the members of the freshman class are engaged in agriculture or horticulture; 23 per cent. are artisans; 31 per cent. are engaged in business; and 10 per cent. are professional men. Approximately one-fourth of the class come from farms; nearly two-fifths have had no farm experience whatever; the balance, while not having been brought up on a farm, still have had limited experience in farm work. The average age of the class is 18.94 years. (See Table V.)

THE COMMISSION ON ECONOMY AND EFFICIENCY AND LEGISLATIVE APPROPRIATIONS.

The trustees presented to the Legislature of 1913 requests for special appropriations amounting to \$250,000. Of this amount \$210,000 represented a request for an agricultural building, and \$40,000 for general improvements and repairs. The total asked for current appropriations was \$300,000, the increase of \$50,000 to be distributed between investigations and instruction, with an additional item for annual repairs.

In December, 1912, the Commission on Economy and Efficiency, which was established by the Legislature of 1912, sent an expert to the institution to make a thorough investigation as to the needs of the institution, business methods employed, and general matters of administration. After an exhaustive study had been made and several hearings held before the full commission it was agreed that the college should have a continuing appropriation for current expenses to cover a period of five years. The bill embodying a schedule of such appropriations was passed by the Legislature. A summary of the provisions of this bill will be found in Table II.

On recommendation of the Commission on Economy and Efficiency the Legislature appropriated about \$80,000 for additions and improvements at the college. The principal items were those for an addition to French Hall, \$35,000, an infirmary, \$15,000, improvements, \$26,000. (See Table II.)

COMMENCEMENT.

At the annual commencement in June, 90 seniors received the degree of Bachelor of Science, a number slightly in excess of that of 1912. The college also conferred the degree of Master of Science on one candidate. Hon. Seth Low of New York City delivered the commencement address, taking as his subject, "Agricultural Colleges." The attendance at the alumni dinner was 232.

THE MAJOR SYSTEM.

The major system has been given a full year's trial, and, on the whole, has proved to be highly successful as a method of securing for the individual a more adequate training in the subject selected. After a year's trial there seems to be but few modifications desirable. The new department of microbiology now has a major, but the major in general horticulture has been discontinued. The subjects which are offered as major courses, and the number of juniors and seniors this year enrolled in each, are indicated in the table below. It should be noted that agriculture, pomology, and animal husbandry, three strictly practical agricultural subjects, have large enrollments. This table clearly shows, it seems to me, that the college is largely and definitely educating its students toward practical agricultural vocations.

SUBJECT.	Seniors.	Juniors.
Agriculture,	8	16
Agronomy,	2	1
Animal husbandry,	12	9
Dairying,	2	3
Poultry husbandry,	2	2
Horticulture,	2	—
Forestry,	1	5
Floriculture,	3	4
Landscape gardening,	18	16
Pomology,	26	16
Chemistry,	10	8
Entomology,	8	9
Botany,	1	6
Agricultural education,	3	4
Microbiology,	—	4
Total,	98	103

NEW APPOINTMENTS.¹

The more important appointments of the year are those of F. H. H. Van Suchtelen, Ph.D., assistant professor of microbiology; Harold E. Robbins, M.A., assistant professor of physics, as successor to Mr. Chester A. Butman; Hubert D. Goodale, Ph.D., as research biologist in poultry husbandry and Miss Laura Comstock, extension professor of home economics.

Assistant Professor Van Suchtelen received his university education in Germany, receiving the degree of Doctor of Philosophy from the University of Göttingen. Subsequently, he came to America and served at the Michigan Agricultural College as teacher and investigator. Dr. Van Suchtelen is a student and investigator of high rank, and his addition to our faculty is a valuable one.

Assistant Professor Robbins is a graduate of Trinity College (Hartford), and has pursued postgraduate study at Yale University. He has had a successful experience as a teacher, both in high school and in college work.

Dr. Goodale graduated from Trinity College (Hartford) in 1904, and then pursued graduate study at Columbia University, earning the degree of Doctor of Philosophy at that institution. He has had several years' experience in practical work and as an investigator in experimental evolution.

Miss Comstock is a graduate of Buffalo, N. Y., Normal School and of Pratt Institute. She has had several years' experience as a teacher, and since 1906 has been professor of home economics at the University of Maine. Her engagement at this institution as extension professor of home economics, meets a long-felt want, and will supply instruction for which there is great need and general demand.

RESIGNATIONS.¹

During the year Prof. Edward A. White, head of the department of floriculture, was elected to a similar chair at Cornell University. The opportunity was an attractive one, and Professor White decided to accept the position. Professor White's resignation represents a distinct loss to the Massachusetts

¹ A complete list of the resignations and of new appointments during the year will be found in Table VII.

Agricultural College, and it will be difficult to secure a successor who will develop the department and carry on the work as satisfactory as did he. Professor White came to the institution in 1907, and at once undertook the organization of a department of floriculture. At the time of his resignation it is one of the strongest and best equipped departments in the institution; indeed, it is doubtful if any college in the country has a stronger department of floriculture.

CHANGES IN BOARD OF TRUSTEES.

I regret to have to report the retirement of Mr. M. F. Dickinson from our Board of Trustees. His resignation was submitted early in 1913, and was due to continued ill health. Mr. Dickinson became a member of the Board of Trustees in 1905, and was reappointed by Governor Foss in 1912. During his service on the Board of Trustees, Mr. Dickinson took an exceptionally active interest in all questions which came before the Board for consideration. His advice was frequently sought, and his opinions always had much weight with the other members of the Board. It is with deep sense of the loss sustained by the college that we report this resignation. Mr. Dickinson's successor is Mr. George P. O'Donnell of Northampton.

The new classification of stenographers and clerks, which your honorable body established last June, has worked thus far, I am glad to say, with little or no friction, and I see no reason to believe that it will not continue to work smoothly and satisfactorily.

Last April President Butterfield left the college to serve as a member of the United States commission to investigate and study in European countries co-operative farm financing. He returned to the campus in August and remained till the middle of October, when again he left on the leave of absence which extends till next May. It is needless for me to try to say how much the faculty miss his guidance and inspiration, and how much they hope that his well-deserved furlough may be fully enjoyed. We shall all be glad to welcome him back again.

It is a great pleasure for me to report that ever since the president's departure for Europe last April, the multiplicity of details that infest the president's office has been most effi-

ently handled by Mr. Ralph J. Watts, the president's secretary. And it is equally as great a pleasure for me to report that the burdens of the president's office have in a large part been willingly and cheerfully shared by my loyal colleagues on the faculty. The whole-hearted support and the generous co-operation of my fellow workers has made my task in many ways much easier than I anticipated.

SCARLET FEVER.

Last January, just before the midyear examinations, the scarlet-fever epidemic, which brought suffering and gloom into many homes in the Connecticut valley, broke out within our college walls. It came upon us without warning, and in a moment brought the utmost dismay and sorrow into our college home. Twenty-five of our students were afflicted, and of those four failed to survive. Our dead friends and brothers were Edward Woodman, Jr., Portland, Me., class of 1915; Rutherford S. Treat, Seymour, Conn., class of 1916; Warner H. Burt, Longmeadow, Mass., class of 1916; T. Vincent Cannon, Newton, Mass., short course.

They were all splendid fellows, and their precious memories still abide to bless and to inspire us. Our earnest sympathy will never fail to go out to their sorrowing parents and relatives.

The suddenness of the attack and the comparatively large number of students affected, found the college almost entirely unprepared to cope with the situation. But the lack of preparation and inadequate equipment were in a great measure met by the energy, the prompt action, the willing self-sacrifice, and the whole-hearted co-operation of the entire community. Every one turned in and helped. The State authorities were here as soon as possible, the Amherst College infirmary was immediately and generously at our disposal, the Kappa Gamma Phi House was converted into a hospital and the Kappa Sigma House into a detention home; the nurses and physicians of the community responded with alacrity to the great need. The expedition with which the college and its friends met the situation mitigated greatly the results of the disease, and our indebtedness to friends within and without is in no measure suggested by the depth of our gratitude.

The epidemic was the most serious in the history of the college. The State Board of Health, in conjunction with the college, made a most careful investigation, but without avail. No one could point to a clear and definite cause, and it will probably never be known. Though a lesser item in the sad story, it will not be out of place to mention that the expense incurred was approximately \$4,500. This was borne completely by the college.

LECTURESHIP ON WORLD POLITICS.

On October 1 the trustees authorized an annual lectureship on "World Politics," — the first lectureship of its kind established in this country. At the same meeting Mr. R. L. Bridgman of Boston was invited to deliver the first series. The choice was a most happy one, for few scholars, if any, have studied certain phases of this great subject with more thoroughness and enthusiasm than has Mr. Bridgman. At this writing, two of these lectures have been delivered and they have been heard by large and appreciative audiences.

IMPROVEMENTS AND REPAIRS.

Numerous improvements and repairs were made during the summer. The addition to French Hall, for which an appropriation of \$35,000 was granted by the last Legislature, was started about the middle of July. The contractors were unable to secure the terra cotta trimmings, and accordingly not much progress was made until the latter part of October. Since then the work has gone forward rapidly, and the building will be completed during the coming year.

The principal improvements made during the summer were the macadam road extending from the entrance to the college grounds on the county road to the chapel, a 6-foot granolithic walk from the entrance to the grounds on the Stockbridge road to the old Durfee range of greenhouses, and a 6-foot walk adjoining the present granolithic walk east of the chapel and continuing to the stone bridge. Small strips of walk were constructed at Draper Hall and at Flint Laboratory. In addition, numerous cinder paths were made and some of the old tar walks were resurfaced. The dormitory rooms in South

College were thoroughly renovated and put in first-class condition. The rooms in North College were all repainted. The greenhouse at the experiment station was repaired.

THE YEAR IN THE DEPARTMENTS OF INSTRUCTION.¹

In the Division of Agriculture. — Owing to an increase in the number of students, the work in the different departments of the division of agriculture has increased during the year. This makes the need for suitable classrooms and laboratories most urgent. All five of the departments of the division, as well as the department of microbiology, are now crowded into Flint Laboratory, which was designed for the work in dairying only. This greatly hampers the work of all the departments and decreases the efficiency of the instruction given; laboratory work in some departments has to be omitted altogether. It seems incredible that the people of Massachusetts will longer delay furnishing adequate facilities for departments whose work touches so closely and so vitally the interests of the practical farmer. In addition to the work of instruction, the demands made upon these departments for extension work are constantly increasing. There are also many problems of the practical farmer calling for solution that need the attention and investigation of every department of the division.

The work of the department of agronomy has increased rapidly, and a graduate assistant, giving half his time to the department, has been secured. The most important needs of the department are laboratory facilities for work in soils, fertilizers, and field crops.

During the past year the department of animal husbandry has assumed the responsibility for the selection, care, and management of the live stock on the college farm. A good three-year-old Percheron stallion and two young bulls of excellent breeding have been purchased.

After using Flint Laboratory for about a year, the department of dairying pronounces it most satisfactory for the purpose of instruction. The department is now clarifying and pasteurizing all milk used at the college dining hall, thus making the supply an excellent one.

¹ The directors and heads of divisions were asked to submit a résumé of the work which had been conducted under their direction during the year, and these statements have been freely utilized in the present report.

A research biologist has been added to the staff of the department of poultry husbandry. The work of this trained investigator cannot fail to be of great service to the poultrymen of Massachusetts. Other buildings of the department have been finished, including two small buildings for storage and a colony breeding house. More land for experimental purposes is needed.

In the department of farm administration an extension to the young stock barn and a bungalow for farm help, built during the latter part of the year, should be mentioned. Plans for a piggery to be built in the spring are also being prepared. Modern tools of the different types for demonstration purposes are urgently needed.

In the Division of Horticulture. — The work in this division has developed in a normal fashion along lines previously adopted. The division has suffered during the year by the resignation of Prof. Edward A. White, as head of the department of floriculture. The much-needed addition to French Hall is now being constructed; when completed this building will be one of the most attractive structures on the campus, and will provide several additional classrooms and laboratories for the departments there housed.

The head of the division of horticulture makes the following statement: —

The most serious and fundamental problem which we face is that of the college curriculum. The feeling is unanimous among the members of the horticultural staff that the work should be greatly intensified and substantially improved in all its technical aspects. We believe that it should be given more attention in the curriculum, and that it is very desirable to have some work, very carefully organized, advanced to an earlier position in the four-year course. We believe, also, that provision should be made at once, by a somewhat radical readjustment, for technical instruction throughout the summer. It hardly seems reasonable that we should longer continue to close our work to our four-year students during that portion of the year when subjects of technical importance are most accessible.

In the Division of Science. — During the collegiate year the work of this division has progressed along the usual lines. A certain amount of revision and rearrangement of the courses previously offered has been made, but nothing affecting general

policies; the changes have been for the purpose of securing greater efficiency. An examination of the statements supplied by the different departments indicates that in some cases more room is needed for class and laboratory work. The department of chemistry is in pressing need of a new building. The most important problems in this division at the present time seem to be (1) the necessity for a closer co-ordination of the work in the different departments of the division, and (2) a determination of the relation of the work when formulated to that demanded by other divisions.

In the Division of the Humanities. — The head of this division reports progress in the further organization of the departments under his direction. The efficiency of the work which can be done under the present conditions is greatly impaired because the various departments are scattered about the campus; in some cases a department has no headquarters. The need of a properly equipped library is felt very keenly by all members of this division. Inasmuch as certain proposed changes are being advocated in the course of study, it is felt that the teachers in this division are not yet able to do their best work.

In the Division of Rural Social Science. — The instructors in this division continue to hold the opinion that a major in rural social science should be offered for the benefit of those students desiring to specialize in this work. The most pressing need of the division is for adequate and convenient housing facilities. At present the various departments are scattered about the campus in buildings provided for and occupied by other departments. The most efficient work cannot be carried on under these conditions.

In the department of agricultural economics the work has developed along lines already established. From April to July the head of this department accompanied the federal commission to investigate rural credit and co-operation in Europe. An investigation has been conducted relative to the facilities for farm credit in Massachusetts.

In the department of agricultural education the promotion of boys' and girls' agricultural clubs has become a prominent feature. (Statistics relative to the enrollment in this work are found in Table III.) The department is also endeavoring to develop closer relations with the public schools in the matter

of preparing teachers of agriculture and related sciences. There is at this time under consideration a plan whereby the students preparing for that work may, under expert supervision, obtain practice in teaching. The demand for agricultural teaching in secondary schools has become much greater than the supply of qualified persons.

In the department of rural sociology a prominent aim is the promotion of interest in rural-life problems. Surveys of social conditions in near-by towns form a part of the instructional work. One such survey was completed during the past year; this survey work is done in part by graduate students. There is an increasing number of men coming into the department with the specific purpose of fitting themselves for some form of social service.

In the Library. — There were 2,969 volumes added during the year, making a total of 41,069 volumes on hand. Of this number, 10,860, or more than 25 per cent. of the entire library, have been added during the past five years. The new card catalogue in process of making contains cards for the 17,278 volumes re-catalogued, and the 7,593 new volumes catalogued since April 1, 1910. One of the most important and gratifying events of the year was the decision of the Carnegie Institution of Washington to place the college library upon its "omnia list," to receive all of its publications without charge. This is a recognition of the work the library is doing and the place it fills in this community. The Academy of Natural Sciences of Philadelphia has recently taken similar action. The regular library extension work continues and was supplemented this year by the publication of five library leaflets listing the best books for fruit growers, poultrymen, dairymen, vegetable gardeners, and farm women.

The very urgent need of this department, and, in fact, the need of the institution, is for a new library building. The climbing of stepladders in search of books, the eager hunt for unoccupied chairs, and the crowded aisles are grave hindrances to real, serious study. Office and workroom accommodations are discouraging; faculty and graduate school workers are crowded in among the students, and the reading room is grossly inadequate. As long as the library continues in such straightened circumstances, just so much will our students lose in the

way of proper working accommodations in what ought to be the finest and best working laboratory on the campus. More than this, we feel that a new library building would do much to stimulate real spirit for study and to create a better academic atmosphere.

In the Department of Physical Education and Hygiene. — The work of the department during the past year has been conducted along the following lines: —

1. The physical examination of each freshman, to ascertain the condition of health and physical development, and to detect defects which may exist, especially in sight, hearing, heart, and lungs. Each person thus examined is advised as to the form of exercise best suited to his individual condition.

2. The freshman class receives instruction in physiology and personal hygiene in a course of lectures given by the physical director.

3. During the winter months the department requires three hours of physical exercise per week of each member of the three lower classes. Those men who have been found by examination to be physically normal are permitted to elect one of the several athletic activities; those who have been found to be below normal physically are given individual instruction. Walking trips may be substituted for physical exercise in the gymnasium; during the past year from 75 to 100 students elected this form of exercise.

The work of the indoor classes of from 30 to 40 men consists of gymnastic exercises and such games as basket ball and indoor baseball. The physical director is general manager of athletics, supervising the arrangements for contests with other colleges, buying the supplies for the teams, assisting in the coaching and having final control of the conduct of players and games. During the past year the trustees have created a body for the control of athletics, and for the first time are giving definite recognition to these activities. The past year has seen a great increase in interest in athletic recreation, and the records show that over 40 per cent. of the students participated in one or more sports regularly and under official supervision.

In the Department of Military Science. — Owing to the increased number of students more companies have been formed,

so that we now have two battalions of four companies each and a band. The organization is that of the regular infantry of the United States army, and the work is along the lines of work done by infantry.

Great interest is still maintained in the intercollegiate rifle contests. This year the indoor team won the eastern league championship, but the University of West Virginia, winner of the western league championship, defeated our team for the college championship. On the outdoor range we won the college championship for the United States by the score of 825, 6 men shooting 10 rounds each at 200, 300, and 500 yard ranges. Harvard was second with 791, our previous record score. In the last four years this college has won the indoor championship three times and second place once, and has made a like record on the outdoor range.

Four hundred and fifty men have drilled during the year, 16 of them being of the senior class, with whom drill is elective. Fourteen of the last graduating class were reported to the Adjutant General of the army and the Adjutant General of the Commonwealth of Massachusetts as being proficient in drill, and recommended for commissions in the militia of the volunteer army.

This fall there has been started a signal corps detachment; this will be a great help in the field work of the regiment. The band is in excellent condition and deserves to be continued and better equipped with instruments. The uniform has been increased and changed; it now consists of olive-drab cap, blouse, trousers, leggings, shirt, and campaign hat. This is an improvement over the old blue uniform. This uniform is of the very finest quality and costs \$17.85. At the annual inspection, May 21, 1913, made by the officer sent by the War Department, we were given a most excellent report on the work done.

THE GRADUATE SCHOOL.

The total number enrolled by registration during the year 1912-13 was 28; the total number registered in the fall of 1913 thus far is 39. At the beginning of this college year a tentative organization of the school was accepted by the Board of Trustees. It is felt that the growth is as rapid as is com-

patible with the best interests of the department. Furthermore, it seems advisable that we should keep the numbers within certain limits. The ambition of the director is to cluster about every capable teacher on the campus one, two, or three graduate students. To go beyond this number would mean more than many of the departments can effectively care for. The needs of the graduate school are largely departmental, and are of such a nature that only time can supply. The important problem is to turn out well-equipped and effective men. By this is meant men who are sympathetically and broadly trained in fundamental education, and intensely trained in some special field for some particular pursuit.

THE YEAR IN THE EXPERIMENT STATION.

It is with pleasure that we welcome back to active service Dr. William P. Brooks as director of the experiment station. His prolonged leave of absence restored him to normal health and strength. During his absence the work of the experiment station was very efficiently conducted by Mr. Fred W. Morse.

Agricultural Department. — The leading lines of experimentation have followed very closely the plans mapped out in former years, and have had to do chiefly with the specific effects of various fertilizer materials and combinations and methods of using manure. Investigations along these lines have been carried through to a successful conclusion. Owing to a low temperature when the trees were in bloom, the Graves orchard produced no fruit this year. The experiment station orchard, on the other hand, yielded its heaviest crop. The fertilizer work with asparagus in Concord has been continued with satisfactory results. The cranberry bog of the substation at Wareham has given a very large crop, yielding about 1,250 barrels; the sale of the crop will undoubtedly bring the station an income of at least \$6,000. The experiment results have been clear and decisive in certain important points, chiefly throwing light upon methods of repelling the attacks of injurious insects. The weather observations of the substation, in co-operation with the United States Weather Bureau, promise to prove of much value in enabling Dr. Franklin to forecast probability of frosts.

Department of Plant and Animal Chemistry. — Inspection

Work: The work of this department has been conducted the past year without any interruptions. The inspection work of the department shows a gradual increase. Approximately 1,300 samples of fertilizers and 902 samples of cattle feeds have been collected and examined. During 1912, 6,056 pieces of glassware were tested, the machines in 180 creameries and milk depots were inspected, and 33 men were examined for proficiency in operating the test; 27 of these were given certificates. About the usual number of samples of water, milk, soils, manurial residues, and other materials of an agricultural nature have been analyzed during the year.

Cow-testing Work: Three men have been employed continuously in making yearly tests of Guernsey, Jersey and Ayrshire cows, and during the year 13 men have been employed at different times on Holstein-Friesian tests.

Miscellaneous Work: During the year this department has published three bulletins, — one on the inspection of commercial fertilizers, another on the inspection of commercial feed-stuffs, and a third on the cost of milk production.

New Work undertaken: Studies have been undertaken of the relative value of phosphatic slag as a source of phosphoric acid, also the relative value of Stonemeal and New Mineral Fertilizer as compared with standard mixed fertilizers.

The various lines of work in progress require the constant services of ten chemists, one laboratory helper, one inspector, two clerks, one assistant in animal nutrition, besides numerous men in connection with the cow-testing work.

Substantial progress has been made in methods for the determination of the composition of butter fat and of the effect of food groups in modifying the butter-fat molecule. Progress has also been satisfactory in a study of the effect of fertilizers upon asparagus and cranberries. Work has been more particularly confined to the composition of asparagus tops and to cranberry bog water.

Department of Vegetable Pathology and Physiology. — The amount of work coming to this department continues to increase so that at present the need for another assistant is keenly felt. During the past year much time has been spent by experts in the department traveling about the State investigating the various outbreaks of plant diseases. Much work

has also been done in testing seeds for farmers in the vicinity of the college.

The head of the department feels that a great deal more work should be done on soil sterilization and the cause of its effects on plant growth, together with the discovery of improved methods. New methods of treating plant diseases should be worked out with the idea of eliminating spraying. The chestnut blight should be studied from the remedial point of view. The subject of electricity as related to the stimulation of plant growth is by no means understood, and in the future a great deal of a practical nature will be learned. There has recently been found in the laboratory a 70 per cent. increase in nitrogen fixation by the stimulation of atmospheric electricity, and outside of the necessary apparatus this can be gathered without expense.

Horticultural Department. — The year's work in the division of horticulture has gone on without special incident so far as the experimental problems are concerned. Dr. Shaw has put under way very important experiments in the mutual influence of stock and scion, and the Tuxbury land is being developed for the special purpose of this experiment. The most immediate and pressing needs are for additional funds to take up the work in plant breeding and to develop lines of experimental work in floriculture and market gardening.

Department of Poultry Husbandry. — The year has been marked by the establishment of experimental work as a separate division of this department, with a man devoting all his time to investigational work. The investigations thus far have been directed toward an analysis of the flock of standard-bred Rhode Island Reds, in respect to individual differences in fecundity, fertility and hatchability of eggs, and vigor of offspring. The head of this department feels very keenly the need of additional land, additional facilities for housing poultry, and additional labor.

Veterinary Department. — The work of the department has gone forward in accordance with the plan which has prevailed for the last few years. The members of this department are very desirous to undertake investigational work in pathology.

Department of Entomology. — The following notes indicate the work conducted in this department during the year: —

(a) Causes of burning by Arsenicals: Over 4,000 different experiments have now been made, and the results give much of interest and value.

(b) Importance of Wasps as Parasites: During the summer an investigation of everything known on this subject in Europe, so far as concerns our American wasps, has been completed, and has given a firm basis for further research on this problem.

(c) Dates of hatching of our common scale insects.

(d) Control of the Onion Maggot: Last year it was demonstrated that methods recommended hitherto are either worthless or are inapplicable because of cost. This year entirely new methods have been tried, some of which have given very promising results.

Additional expert assistance is needed in this department to meet additional demands made upon it for expert work.

Department of Meteorology. — The work of the year has necessarily followed the routine of previous years; co-operation with the Weather Bureau has been continued as usual, and the regular monthly issue of the weather bulletin has been continued.

THE YEAR IN THE EXTENSION SERVICE.

The organizing of the extension service during the past year has gone forward on the plans previously adopted. After considerable investigation of the methods in vogue in other Land Grant colleges, it is found that the type of organization which we have been trying to establish in this college is in accord with that of other leading institutions. More effort has been placed on correlating the work of the extension service with the several departments and divisions of the college, and establishing proper co-operative relationships with other agencies in the State interested in rural development, than in trying to establish new forms of work, no matter how badly these were needed.

The appropriation from the State, available for the current year, has been \$50,000. With this increased money it has been possible to add new members to the extension service staff, and to take up certain lines of work recommended in former reports. A complete list of new employees is found in Table VII.

Ten Weeks' Courses. — There were 22 given in the winter school of 1913. The constantly increasing attendance, and the often-expressed satisfaction at the quality and kind of work offered, is the best indication of the value of these courses to the people of the Commonwealth. The enrollment was 153.

Summer School of Agriculture and Country Life. — This was resumed in 1913. New courses in recreation, pageantry, handicrafts, home flower growing, insects and diseases were offered in addition to those which have been given in the past. The attendance was 133.

Conference for Rural Community Leaders. — This conference was again held as a closing feature of the summer school. The same organizations co-operated with the college to make the conference a success as in the past. Many communities in this and other States are using the information, inspiration and enthusiasm received at these conferences for a more intelligent handling of their problems.

Boys' Agricultural Camp. — For the first time in its history the college conducted a boys' agricultural camp. These boys, selected from rural communities, were taught agriculture, clean sportsmanship, hygiene, photography, and recreation. The attendance was 33. In order that more boys may be reached, a succession of these camps is being planned in connection with the summer school of 1914.

Poultry Convention. — This year the time of holding the poultry convention was changed from March to July, with the result that the largest number of poultry men ever gathered together at one time in this country was present.

School for Tree Wardens. — This was offered for the first time in 1913. Its purpose was to acquaint those in charge of trees with the best methods of care, use of spraying materials, and of apparatus. The attendance was 44.

Fair Exhibits. — For a long time there has been a demand for a somewhat extensive educational exhibit to be used at agricultural fairs throughout the State. During the past year the extension service has assembled such an exhibit. A large tent was purchased and exhibits were made at seven of the more important fairs. From eight to fifteen demonstrations were given at each fair by officers of the college.

One of the best features of the educational work done by the college this year was the continuation of the boys' stock judging contests at the fairs. Fifteen such contests were held, 126 boys taking part. This form of work has certainly proved to be a liberal education to the boys participating.

College men acted in the capacity of judge 77 times during the year, most of this work being done at the fairs during the fall season. At some places there was only a limited amount of work done; in other places the entire amount of judging at the fair was done by the men in question.

Extension Schools. — The extension schools have been continued in 1913. Eight schools were held in various parts of the State; these schools are becoming more popular each year, and the extension service is unable to conduct nearly all that are requested.

Automobile Demonstration Work. — During the past few months an automobile demonstration truck has been sent about the State in charge of a trained agriculturist. This man spends several days in a community, visiting farms, giving demonstrations, and answering questions on agricultural topics.

Statistics of extension service activities will be found in Tables I and III.

THE IMMEDIATE NEEDS OF THE COLLEGE.

In previous reports to the corporation President Butterfield has set forth in his usual thorough and comprehensive manner the general and special needs of the institution. I can do no better, therefore, than to quote him quite freely on this topic. In last year's report (page 23) he writes: —

Fundamentally, the need of increased appropriations, both for maintenance and for buildings, is due in part to the growth of the college in number of students, but also in part to the increased activities of the college made necessary by the rapidly enlarging field of agricultural research, instruction and dissemination. Our understanding of the rural problem in Massachusetts is constantly broadening, and as our conception of the problem broadens, the necessity of broadening the work of the college in order to help solve the problem also develops.

Heretofore the larger part of this section of the annual report has had to do with the need of increased appropriations for

maintenance and current expenses. Hereafter, however, the president will be relieved not only of this task but also of the great labor and anxiety incident to the passage through the Legislature of this part of the appropriation bill. The Legislature of 1913, as I have said before (page 6), provided an annual sum for the next five years, graduated in character, which will probably meet the situation during that time in a fairly satisfactory manner. The annual sums granted by the Resolve of the Legislature are:—

1914,	.	.	.	.	.	.	.	.	.	.	\$280,000
1915,	.	.	.	.	.	.	.	.	.	.	303,000
1916,	.	.	.	.	.	.	.	.	.	.	325,000
1917,	.	.	.	.	.	.	.	.	.	.	341,000
1918,	.	.	.	.	.	.	.	.	.	.	362,000

While this wise and fairly generous action disposed of one phase of our needs in a manner such as not to vex us soon, and such as makes it unnecessary to refer to them now, the need for buildings and additions, let me emphasize, is to-day greater than ever. The college has grown tremendously in the past three years. We have over 600 students doing regular work on the campus this fall, and the building equipment is entirely inadequate to meet their needs in an effective way. In order to do this, and to be equally as well equipped as other institutions of a similar size, we should have without delay the following buildings: an agricultural building, a new auditorium, a new library, a new chemical building, a good-sized recitation building, a gymnasium and drill hall, and three or four dormitories. These, I say, should be on the grounds now, but under the present financial condition of the State I realize that it is a sheer impossibility to get them, and worse than futile to try.

The trustees, fully realizing both the need and the difficulty, decided at the meeting of October 21 to present a request to the Legislature for only such buildings as were most necessary to relieve the present slim and inadequate equipment, and for such an appropriation as could reasonably be expected the Legislature would approve. The budget for special appropriations to be presented to the Legislature of 1914 is as follows:—

Agricultural building, including equipment, . . .	\$210,000	
To be available in 1914, . . .	\$87,500	\$87,500
To be available in 1915, . . .	122,500	
Student dormitory, . . .		35,000
Minor additions, . . .		10,000
		<hr/>
		\$132,500

APPROPRIATIONS FOR SPECIAL PURPOSES.

An Agricultural Building. — This building has been asked for twice before, and in the report of last year the president says: —

The main item which the trustees desire to press before the Legislature this winter as a special appropriation is one of \$210,000 for an agricultural building. I cannot do better than to quote from my report of a year ago concerning the need of this building: —

Although the college has been open to students nearly forty-five years, it has never had a building devoted specifically to agricultural teaching.

Practically every agricultural college in the country finds it necessary and desirable to make such a building one of the most important on the campus.

The rapid increase in our agricultural students has crowded the agricultural departments out of their old quarters. It is almost impossible to do efficient teaching under present conditions.

The winter short-course students are also inadequately provided for.

The proposed building will have three stories and a basement, and contain offices, classrooms and laboratories for the departments of farm administration, agronomy, animal husbandry and agricultural engineering. It is proposed to erect a fireproof building and to equip it in harmony with the recent developments in these lines of work.

To this statement should be added and emphasized the fact that the building as at present planned will also include an auditorium. This is a very important consideration, for we have no room or building on the campus that will seat all of our students at one time. On this account the unclassified and the graduate students have not been permitted to attend any general college exercises.

Dormitory, \$35,000. — This building has been asked for for some years. If it was ever needed it is needed now; the present dormitories provide for only one-tenth of our students. The number of rooms in private houses within a reasonable distance of the college is very limited; a large part of our students are

living at least a good mile from their classrooms. Moreover, these rooms can be secured only at high rents, — rents in many instances prohibitive to poor students earning their way through college. As I said before, we really should have at least three dormitories without delay, in order to meet properly the present situation. The dormitory the trustees are asking for will accommodate 50 men, and will be managed in such a way that students can secure good living accommodations at a comparatively reasonable cost. It is also expected to bring a fair return on the investment.

Additions, \$10,000. — One-half of this sum, or \$5,000, is desired for the extension of granolithic walks and of macadam roads; the other half, or \$5,000, is desired in order to provide adequate toilet arrangements, suitable storage for coal and vegetables, and larger refrigerating facilities in the basement of the dining hall. Both needs are imperative.

Respectfully submitted,

EDWARD M. LEWIS,

Acting President.

STATISTICS OF THE COLLEGE.

TABLE I. — Attendance.

	Registration Nov. 30, 1912.	Registration Nov. 29, 1913.
Senior class,	91	98
Junior class,	102	103
Sophomore class,	125	140
Freshman class,	184	201
	<hr/> 502	<hr/> 542
Graduate students,	22	39
Unclassified students,	31	24
	<hr/> 555	<hr/> 605
Total doing work of college grade,		
Short courses: —		
Winter school,	131	153
Poultry course,	80	—
Apple-packing school,	40	25
Beekeepers' course,	10	6
Summer school,	—	133
School for tree wardens,	—	44
	<hr/> 261	<hr/> 361
Total,	<hr/> 816	<hr/> 966

TABLE II. — Legislative Budget, 1913.

ITEMS.	Amount asked.	Amount granted.
1. Special appropriations: —		
Agricultural building, including equipment,	\$210,000 00	—
General repairs and improvements,	40,000 00	\$26,000 00
Addition to French Hall,	—	35,000 00
Infirmiry,	—	15,000 00
Architect's fees,	—	4,202 11
	<hr/> \$250,000 00	<hr/> \$80,202 11
2. Current Appropriations: —		
Administration,	—	\$30,000 00
Maintenance and equipment,	—	80,000 00
Investigation,	\$15,000 00	30,000 00
Instruction,	20,000 00	95,000 00
Short courses and extension,	—	50,000 00
Repairs,	15,000 00	15,000 00
	<hr/> \$50,000 00	<hr/> \$300,000 00

Amount granted by the Legislature (Five-year Period).

	1914.	1915.	1916.	1917.	1918.
Administration,	\$30,000	\$31,000	\$32,000	\$33,000	\$34,000
Maintenance and equipment, . .	85,000	90,000	95,000	100,000	105,000
Improvements,	8,000	10,000	10,000	10,000	10,000
Investigations,	20,000	25,000	30,000	35,000	40,000
Instruction,	85,000	90,000	100,000	105,000	115,000
Short course and extension work, .	50,000	50,000	50,000	50,000	50,000
Graduate school,	2,000	2,000	3,000	3,000	3,000
Additional land,	-	5,000	5,000	5,000	5,000
	\$280,000	\$303,000	\$325,000	\$341,000	\$362,000

TABLE III. — *Statistics of the Extension Service for 1913.**Extension Service conducted at the College.*

Farmers' week,	950
Beekeepers' convention,	115
Boys' agricultural camp,	33
Conference on rural community planning,	247
Poultry convention,	362
Correspondence courses: —	
Present enrollment,	582
Courses completed or work dropped during year,	327
Total,	2,616

Extension Service conducted away from the College.

Lectures: —	
Lectures at fairs: number given, 175; attendance, 3,479; Extension schools, number given, 480; attendance, 1,000; Lecture courses (4), number given, 21; attendance, 525; miscellaneous lectures, number given, 433; attendance, 39,063; approximate attendance, 44,067.	
Extension schools: —	
Requests for schools,	23
Number held,	8
Enrollment,	792
Approximate attendance,	1,000
Sessions for men, 240; for women, 160,	400
Demonstration orchards: —	
Demonstration orchards: to 1913, 10; 1913, 3,	13
Renovation orchards: to 1913, 4; 1913, none,	4
Fairs: —	
Number of exhibits made,	7
Number of lectures given at exhibits,	75
Attendance at lectures,	3,479
Number of stock-judging contests held,	15
Number of contestants,	126
Number of times men acted as judges,	77
Farm visits: —	
Visits requested,	173
Visits made by demonstration auto truck,	175
Visits made by other men,	72
Boys' and girls' clubs: —	
Home and school garden: number of clubs, 212; towns represented, 212; members, 19,366.	
Agricultural clubs: number of clubs, 102; towns represented, 102; members, 447.	
Local exhibits,	11
Exhibits at fairs,	19
Traveling libraries: —	
Libraries receiving books,	37
Volumes sent out,	439
Bulletins, etc., sent out,	201

TABLE IV. — *Speakers for the Year.**A. Speakers at Wednesday Assemblies for Year ending Nov. 29, 1913.*

1912.

- Dec. 11. — Prof. George B. Churchill, Amherst College, "Honor."
 Dec. 18. — Mr. Arthur D. Call, Washington, D. C., "A Phase of the High Cost of Living."

1913.

- Jan. 15. — Mr. George T. Powell, New York City, "Agricultural Opportunities."
 Feb. 12. — Pres. F. S. Luther, Trinity College (Hartford, Conn.), "The Education of Hardship."
 Feb. 19. — Rev. G. Glenn Atkins, Providence, R. I., "The Apportionment of Life."
 Feb. 26. — Mr. Timothy E. Byrnes, Boston, "Character the Best Help to Efficiency."
 Mar. 5. — Prof. Curry S. Hicks, Massachusetts Agricultural College, "Physical Education in Western Institutions."
 Mar. 12. — Mr. Lyman Beecher Stowe, New York City, "Junior Republics."
 Mar. 19. — Mr. H. B. Fullerton, Medford, L. I., "Do your Level Best."
 Mar. 26. — Rev. W. H. Stebbins, Charlestown, Mass., "Fundamental Causes of Crime."
 Apr. 16. — His Excellency the Argentina Minister, Dr. Romula S. Naon, "Argentina: Industrial, Commercial, Agricultural."
 Apr. 23. — Mr. James P. Munroe, Boston, "What Business expects of Young Men."
 Apr. 30. — Dr. Joseph L. Hills, University of Vermont, Charter Day Address.
 May 14. — Mr. George D. Leavens, New York City, "Business and the College."
 May 21. — Mr. Jens Jensen, Chicago, "Local Color."
 June 4. — "Lessons of the Year."
 Sept. 17. — Pres. Kenyon L. Butterfield, Massachusetts Agricultural College, "Lessons from Europe."
 Sept. 24. — Hon. Charles E. Ward, Buckland, Mass., "Legislative Methods."
 Oct. 1. — Anniversary Day Program.
 Oct. 15. — Pres. Alexander Meiklejohn, Amherst College, "Scholarship."
 Oct. 22. — Pres. C. H. Spooner, Norwich University, "The Book of Job."
 Oct. 29. — Mr. Harry W. Laidler, New York City, "Socialism."
 Nov. 12. — Pres. L. L. Doggett, Y. M. C. A. College, Springfield, Mass., "The Modern Man's Religion."
 Nov. 19. — Dr. R. J. Floody, Worcester, Mass., "The Boy Problem."

B. Speakers at Sunday Chapel for Year ending Nov. 29, 1913.

1912.

- Dec. 8. — Rev. Henry W. Foote, Boston, "The Aims of Higher Education."
 Dec. 15. — Rev. Allen A. Stockdale, Boston, "The True Definition of Eternal Life."

1913.

- Jan. 12. — Rev. Daniel C. Evans, Cambridge, Mass., "The Voice of Man and the Echo of the World."
 Feb. 16. — Rev. Edward S. Ninde, Providence, R. I., "Obedience to the Heavenly Vision."
 Feb. 23. — Rev. R. H. Potter, Hartford, Conn., "Prepare Ye the Way of the Lord."
 Mar. 2. — Rev. F. S. Child, Griswold, Conn., "Child Welfare."
 Mar. 9. — Rev. E. F. Sanderson, Brooklyn, N. Y., "The Love of God revealed through Man."
 Mar. 16. — Rev. Frank W. Padelford, Boston, "The Mind of Christ."
 Mar. 23. — Rev. William E. Strong, Boston, "Now and Then."
 Apr. 13. — Rev. John C. Adams, Hartford, Conn., "Three Worlds in One."
 Apr. 20. — Rev. Charles Stelzle, New York City, "Some Phases of the Social Problem."
 Apr. 27. — Dr. L. Clarke Seelye, Northampton, Mass., "God's Building."
 Nov. 9. — Rev. J. Herman Randall, New York City, "The Religion of the Modern Man."
 Nov. 16. — Rabbi Stephen S. Wise, New York City, "Ideals and Idealists."
 Nov. 23. — Rev. Robert Goldsmith, Chatham, N. Y., "The Temptation of every Man."

TABLE V. — *Statistics of Freshmen entering Massachusetts Agricultural College, September, 1913.**A. Home Addresses of Students (classified by Towns and Cities).*

Adams,	1	Cataumet,	1	Grafton,	1
Amherst,	10	Chartley,	1	Granby,	1
Ansonia, Conn.,	1	Chelsea,	1	Greenfield,	1
Arlington,	2	Chicopee,	1	Hadley,	1
Arlington Heights,	1	Cincinnati, O.,	1	Hartford, Conn.,	2
Athol,	1	Clinton,	1	Hatfield,	1
Auburndale,	1	Dorchester,	8	Haverhill,	1
Barre,	1	East Weymouth,	1	Hingham,	2
Belchertown,	1	Elizabeth, N. J.,	1	Holden,	1
Bennington, Vt.,	1	Everett,	4	Hopedale,	1
Boston,	5	Fall River,	3	Houlton, Me.,	1
Brockton,	1	Falmouth,	1	Kansas City, Mo.,	1
Brooklyn, N. Y.,	3	Faneuil,	1	Lawrence,	2
Cambridge,	1	Framingham,	2	Leominster,	1
Cape Neddick, Me.,	1	Georgetown,	1	Long Branch, N. J.,	1

A. Home Addresses of Students (classified by Towns and Cities) — Continued.

Lowell,	1	North East, Pa.,	1	Taunton,	3
Lynn,	10	Northfield, Vt.,	1	Tewksbury,	1
Malden,	4	North Reading,	1	Townsend,	2
Mansfield,	1	Norwich Town, Conn.,	1	Turners Falls,	3
Mattapoisett,	1	Nyack, N. Y.,	1	Waban,	1
Medford,	1	Orange, N. J.,	1	Wakefield,	1
Melrose,	3	Pepperell,	1	Walpole,	2
Merrimac,	2	Pittsfield,	1	Waltham,	1
Middletown, N. Y.,	1	Plymouth,	1	Ware,	1
Milford,	1	Poughkeepsie, N. Y.,	1	Watertown,	1
Milford, N. H.,	1	Ridgefield Park, N. J.,	1	Wellesley Farms,	1
Millbury,	1	Rosindale,	1	West Acton,	1
Millis,	1	Rutherford, N. J.,	1	West Bridgewater,	1
Mittineague,	1	Sandwich,	1	Westford,	1
Montague,	2	San Juan, P. R.,	1	West Hartford, Conn.,	1
Monticello, Ky.,	1	Scituate,	1	West Medway,	1
Nantasket Beach,	1	Sharon,	1	West Newton,	1
Natick,	1	Sherborn,	1	Westport, Conn.,	1
New Britain, Conn.,	2	Shrewsbury,	1	Wethersfield, Conn.,	1
Newburyport,	2	Smiths,	1	Whitinsville,	1
Newton Center,	1	Somerville,	4	Winchester,	1
Newtonville,	1	Southborough,	1	Winthrop,	1
New York City,	1	Southbridge,	1	Wilkes-Barre, Pa.,	1
Norfolk,	1	South Carver,	1	Woburn,	1
North Adams,	1	South Framingham,	1	Woods Hole,	1
North Bennington, Vt.,	2	South Hadley Falls,	1	Worcester,	7
North Beverly,	1	Springfield,	6	Yalesville, Conn.,	1
North Brookfield,	1	Sunderland,	2	Yonkers, N. Y.,	1

B. Home Addresses (classified by States).

	Number.	Per Cent.		Number.	Per Cent.
Connecticut,	10	4.97	New York,	8	3.98
Kentucky,	1	.50	Ohio,	1	.50
Maine,	2	1.00	Pennsylvania,	2	1.00
Massachusetts,	165	82.08	Porto Rico,	1	.50
Missouri,	1	.50	Vermont,	4	1.99
New Hampshire,	1	.50			
New Jersey,	5	2.48		201	100.00

C. Home Addresses (classified by Counties of Massachusetts).

	Number.	Per Cent.		Number.	Per Cent.
Barnstable,	4	2.42	Middlesex,	44	26.67
Berkshire,	3	1.82	Nantucket,	—	—
Bristol,	8	4.85	Norfolk,	8	4.85
Dukes,	—	—	Plymouth,	9	5.45
Essex,	19	11.51	Suffolk,	16	9.70
Franklin,	8	4.85	Worcester,	21	12.73
Hampden,	8	4.85			
Hampshire,	17	10.30		165	100.00

D. Nativity of Parents.

	Number.	Per Cent.
Neither parent foreign born,	150	75.00
Both parents foreign born,	31	15.50
Father (only) foreign born,	10	5.00
Mother (only) foreign born,	6	3.00
No statistics,	4	2.00
	201	100.50

E. Education of Father.

	Number.	Per Cent.
Common school,	94	47.00
High school,	56	28.00
Business school,	13	6.50
College or university,	30	15.00
No statistics,	8	4.00
	201	100.50

F. Religious Census.

	MEMBERSHIP.		PREFERENCE.		TOTALS.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Baptist,	22	11.00	4	2.00	26	13.00
Catholic,	21	10.50	-	-	21	10.50
Congregationalist,	36	18.00	28	14.00	64	32.00
Episcopal,	26	13.00	1	.50	27	13.50
Hebrew,	5	2.50	1	.50	6	3.00
Methodist,	12	6.00	7	3.50	19	9.50
Presbyterian,	8	4.00	2	1.00	10	5.00
Unitarian,	10	5.00	7	3.50	17	8.50
Universalist,	3	1.50	3	1.50	6	3.00
Miscellaneous,	1	.50	4	2.00	5	2.50
	144	72.00	57	28.50	201	100.50

G. Occupation of Fathers.

	Number.	Per Cent.
Agriculture and horticulture,	40	20.00
Artisans,	46	23.00
Business,	62	31.00
Deceased or no statistics,	23	11.50
Miscellaneous,	6	3.00
Professional,	21	10.50
Retired,	3	1.50
	201	100.50

H. Intended Vocations of Students.

	Number.	Per Cent.
Agriculture or horticulture (practical),	126	63.00
Agriculture or horticulture (professional),	35	17.50
Miscellaneous,	3	1.50
Professions,	6	3.00
Undecided or no statistics,	31	15.50
	201	100.50

I. Farm Experience.

	Number.	Per Cent.
Brought up on a farm,	48	24.00
Not brought up on a farm and having had no, or practically no, farm experience,	76	38.00
Not brought up on a farm, but having had some farm experience,	74	37.00
No statistics,	3	1.50
	201	100.50

J. Miscellaneous Statistics.

Average age,	18.94 years.
Number applying for student labor,	110 (55 per cent.)
Number boarding at college dining hall,	165 (82.5 per cent.)

TABLE VI. — *Entrance Statistics of Freshman Class.*

Number of applications,	332
Admitted,	228
Matriculated,	201
Failed to report,	27
Total,	228
Rejected,	104
Total,	332
Admitted on certificate,	86
Admitted on examination,	17
Admitted on certificate and examination,	98
	201
Admitted without condition,	122
Admitted with condition,	79
	201

TABLE VII. — *New Appointments.**In the Academic Departments.*

POSITION.	Name.	Institution from which graduated and Degrees.
Graduate assistant in agricultural economics,	Charles G. Baird,	University of Kansas, A.B., 1911; University of Wyoming, A.M., 1913.
Instructor in zoölogy and geology,	Frank N. Blanchard,	Tufts College, A.B., 1913.
Graduate assistant in chemistry,	Henry L. Brown,	Massachusetts College of Pharmacy, Pharm.D., 1911; University of Maine, B.Sc., 1913.
Graduate assistant in microbiology,	Ernest L. Davies,	Toronto University, B.S.A., 1913.
Instructor in market gardening,	Bert C. Georgia,	Cornell University, B.Sc., 1913.
Assistant in physical education,	Harold M. Gore,	Massachusetts Agricultural College, B.Sc., 1913.
Assistant in mathematics,	Burt A. Hazeltine,	Tufts College, B.Sc., 1913.
Graduate assistant in landscape gardening,	Walter H. Hillary,	Pennsylvania State College, B.Sc., 1913.
Graduate assistant in microbiology,	Arao Itano,	Michigan Agricultural College, B.Sc., 1911.
Graduate assistant in agronomy,	Russell F. Lund,	St. Lawrence University, B.A., 1909.
Assistant professor of physics,	Harold E. Robbins,	Trinity College, B.Sc., 1908; Yale University, M.A., 1911.
Graduate assistant in chemistry,	Harold A. Robinson,	New Hampshire College, B.Sc., 1913.
Graduate assistant in chemistry,	Paul Serex, Jr.,	Massachusetts Agricultural College, B.Sc., 1913.
Graduate assistant in rural sociology,	Carl J. Strand,	Augustana College, A.B., 1907; University of Illinois, A.M., 1908.
Graduate assistant in floriculture,	Clark L. Thayer,	Massachusetts Agricultural College, B.Sc., 1913.
Assistant professor of microbiology,	Frans Herman Hesselink Van Suchtelen.	University of Göttingen, Ph.D., 1910.

In the Experiment Station.

POSITION.	Name.	Institution from which graduated and Degrees.
Assistant chemist,	James P. Buckeley, Jr.	Massachusetts Institute of Technology. ¹
Assistant chemist,	Walter S. Frost,	Tufts College, B.Sc., 1912.
Research biologist,	Hubert D. Goodale,	Trinity College, A.B., 1903; Trinity College, A.M., 1904; Columbia University, Ph.D., 1907.
Graduate assistant in horticulture, . . .	John B. Norton,	University of Vermont, B.Sc., 1913.

In the Extension Service.

Extension professor of home economics, .	Miss Laura Comstock,	Buffalo State Normal 1895; Pratt Institute, 1909.
Instructor in civic improvement, . . .	Philip H. Elwood, Jr.,	Michigan Agricultural College, B.Sc., 1905; Cornell University, B.S.A., 1910.
Supervisor of correspondence courses, .	Erwin H. Forbush,	Connecticut Agricultural College, 1910.
Demonstrator in charge of automobile truck.	Allister F. McDougall,	Massachusetts Agricultural College, B.Sc., 1913.

¹ Did not graduate.*In the Clerical Force.*

POSITION.	Name.
Clerk in the library,	Miss Clarissa C. Babcock.
Clerk in the library,	Miss Ada M. Chandler.
Library assistant,	Miss Lena Chapman.
Assistant to the dean,	Miss Bertha E. Christiansen.
Stenographer, extension service,	Miss Marion S. Donaldson.
Clerk in the division of humanities and in the experiment station,	Miss Rebecca L. Mellor.
Stenographer, extension service,	Miss Cora B. Grover.
Stenographer, department of entomology,	Miss Marion Guertin.
Clerk to the director of the graduate school and in the division of agriculture.	Miss Esther L. Houghton.
Clerk, department of poultry husbandry,	Miss Fay L. Milton.
Stenographer, division of rural social science,	Miss Nell C. Milton.
Stenographer, extension service,	Miss Ina M. Paige.
Clerk, department of floriculture,	Miss Dorothy Smith.
Clerk, registrar's office,	Miss Olive M. Turner.

Miscellaneous.

POSITION.	Name.
Farm superintendent,	John J. Barber.
Foreman of apiary,	John L. Byard.
Foreman of grounds,	Lawrence S. Dickinson.

Resignations.

Instructor in physics,	Chester A. Butman.
Supervisor of correspondence courses,	Arthur T. Dailey.
Farm superintendent,	Edwin H. Forristall.
Clerk, department of floriculture,	Miss Helen V. Gaskill.
Stenographer, department of rural social science,	Miss Ruth M. Hager.
Lecturer in history,	George N. Holcomb.
Clerk, registrar's office,	Miss Georgia A. King.
Clerk, department of poultry husbandry,	Miss Mary R. Kingsbury.
Clerk, dean's office,	Miss Virginia Noble.
Assistant in mathematics and military science,	Samuel R. Parsons.
Assistant chemist, experiment station,	George R. Pierce.
Assistant chemist, experiment station,	James C. Reed.
Correspondence clerk, president's office,	Miss Stella H. Webb.
Professor of floriculture,	Edward A. White.
Assistant professor of market gardening,	Frederick L. Yeaw.

Change in Title of Officers of the Institution.

NAME.	Former Title.	Present Title.
Joseph S. Chamberlain, .	Associate professor of organic and agricultural chemistry.	Professor of organic and agricultural chemistry.
Walter W. Chenoweth, .	Instructor in pomology, . . .	Assistant professor of pomology.
George E. Gage, . . .	Assistant professor of veterinary science.	Associate professor of veterinary science.
John C. Graham, . . .	Associate professor of poultry husbandry.	Professor of poultry husbandry.
Arthur K. Harrison, . .	Instructor in landscape gardening.	Assistant professor of landscape gardening.
William P. B. Lockwood, .	Associate professor of dairying, .	Professor of dairying.
Elmer M. McDonald, . .	Instructor in agronomy, . . .	Assistant professor of agronomy.
Jacob K. Shaw, . . .	Assistant horticulturist, experiment station.	Research pomologist of the experiment station.

REPORT OF THE TREASURER.

FOR THE FISCAL YEAR ENDING NOV. 30, 1913.

BALANCE SHEET.

	DR.	CR.
1912.		
Dec. 1. To balance on hand,	\$23,270 91	
1913.		
Nov. 30. To receipts for fiscal year (see Schedule A),	557,930 17	
Expenditures for fiscal year (see Schedule B),		\$540,217 78
Balance on hand,		40,983 30
	\$581,201 08	\$581,201 08

STATEMENT OF THE FIRST NATIONAL BANK OF AMHERST WITH THE
MASSACHUSETTS AGRICULTURAL COLLEGE.

	DR.	CR.
1912.		
Dec. 1. Balance on hand,	\$45,209 67 ¹	
1913.		
Nov. 30. Deposits for year,	559,479 51	
Interest,	1,748 91	
Disbursements as per warrants,		\$545,433 72
Balance on hand,		61,004 37 ¹
	\$606,438 09	\$606,438 09

¹ These amounts are greater Dec. 1, 1912, by \$28,791.20, and Nov. 30, 1913, \$29,841.81, on account of outstanding checks.

SCHEDULE A. — INCOME.

	Items.	Totals.
Income from students and others,		\$104,090 89
Tuition fees,	\$1,940 00	
Laboratory fees,	4,966 00	
Rents,	4,885 43	
Dining hall,	51,866 36	
Department sales,	34,556 42	
Department transfers,	2,829 92	
Miscellaneous,	3,046 76	

SCHEDULE A. — INCOME — *Concluded.*

	Items.	Totals.
Income from grants by nation and State: —		
State aid,		\$315,216 58
Income from endowment,	\$3,313 32	
Appropriation for current expenses,	185,000 00	
Administration,	\$30,000 00	
Maintenance,	80,000 00	
Instruction,	75,000 00	
Appropriation for extension service,	\$50,000 00	
Appropriation for experiment station,	21,000 00	
Maintenance,	\$15,000 00	
Feed law,	6,000 00	
Receipts from special appropriations,	55,903 26	
Federal aid,		70,633 33
Income from land grant of 1862,	\$7,300 00	
Income from Hatch fund of 1887,	15,000 00	
Income from Adams fund of 1906,	15,000 00	
Income from Nelson fund of 1907,	16,666 36	
Income from Morrill fund of 1890,	16,666 67	
Income from other sources: —		
Income from experiment station,		28,825 16
Fertilizer receipts,	\$10,580 00	
Agricultural receipts,	2,746 36	
Cranberry receipts,	5,884 50	
Chemical receipts,	9,128 76	
Miscellaneous,	485 54	
Income from extension service,		5,971 21
Winter school receipts,	\$3,489 15	
Summer school receipts,	902 99	
Correspondence courses receipts,	693 70	
Itinerant instruction receipts,	530 91	
Miscellaneous,	354 46	
Received on account of student trust funds,		33,193 00
		\$557,930 17

CLASSIFICATION OF INCOME FROM STUDENTS AND OTHERS.

	Laboratory Fees.	Department Sales.	Transfers.	Rents.	Income.	Miscellaneous.	Dining Hall.	Tuition.	Total.
Agricultural education,	-	\$22 74	\$228 25	-	-	-	-	-	\$250 99
Agronomy,	\$100 25	8 83	-	-	-	-	-	-	109 08
Animal husbandry,	-	-	30	-	-	-	-	-	30
Botany,	712 45	22 45	-	-	-	-	-	-	734 90
Chemistry,	2,732 75	19 52	32 48	-	-	-	-	-	2,784 75
North dormitory,	-	-	-	\$2,308 34	-	-	-	-	2,308 34
South dormitory,	-	-	-	2,127 67	-	-	-	-	2,127 67
Chapel,	-	-	-	-	-	-	-	-	2 13
College residences,	-	-	2 13	449 42	-	-	-	-	449 42
Dairying,	-	3,994 16	555 24	-	-	-	-	-	4,549 40
Entomology,	176 50	15 47	-	-	-	-	-	-	191 97
Farm,	-	19,861 99	996 82	-	-	-	-	-	20,858 81
Farm administration,	-	33 85	-	-	-	-	-	-	33 85
Floriculture,	-	3,295 64	25 00	-	-	-	-	-	3,320 64
General horticulture,	-	1,123 93	301 74	-	-	-	-	-	1,425 67
Grounds,	-	85	2 23	-	-	-	-	-	3 08
Landscape gardening,	487 50	1 60	1 50	-	-	-	-	-	489 10
Library,	-	139 07	5 50	-	\$416 68	-	-	-	561 25
Market gardening,	-	2,103 69	27 43	-	-	-	-	-	2,131 12
Microbiology,	210 00	-	-	-	-	-	-	-	210 00
Military,	-	5 50	-	-	-	-	-	-	5 50
Physical education,	140 00	2 50	-	-	-	-	-	-	142 50
Physics,	-	-	2 30	-	-	-	-	-	2 30
Pomology,	67 55	1,780 77	7 50	-	-	-	-	-	1,855 82
Poultry,	15 00	2,070 04	74 14	-	-	-	-	-	2,159 18
Veterinary,	-	5 00	16 65	-	-	-	-	-	21 65
Zoology,	324 00	8 45	65	-	-	-	-	-	333 10
Operating and maintenance,	-	-	299 96	-	-	\$2,630 08	-	\$1,940 00	4,870 04
Treasurer's office,	-	11 27	-	-	-	-	-	-	11 27
President's office,	-	4 20	-	-	-	-	-	-	4 20
Salaries,	-	-	250 00	-	-	-	-	-	250 00
Hospital,	-	-	-	-	-	-	-	-	26 50
Dining hall,	-	26 50	-	-	-	-	\$51,866 36	-	51,866 36
Total	\$4,966 00	\$34,556 42	\$2,829 92	\$4,885 43	\$416 68	\$2,630 08	\$51,866 36	\$1,940 00	\$104,090 89

SCHEDULE B. — EXPENDITURES FOR FISCAL YEAR.

	Items.	Totals.
College expense,		\$284,080 75
Administration,	\$29,404 08	
Maintenance,	140,815 22	
Instruction,	109,482 25	
Hospital expense,	4,379 20	
Experiment station,		75,757 55
Administration,	\$1,234 06	
Feed inspection,	6,184 05	
Fertilizer law,	10,560 77	
Salaries,	32,679 14	
Departments,	25,099 53	
Extension service,		46,297 65
Special appropriations,		51,548 35
Student trust funds,		31,633 42
Dining hall,		50,900 06
		\$540,217 78

ANALYSIS OF COLLEGE EXPENDITURES.

ADMINISTRATION.										
	Office Expense.	Salaries and Labor.	Travel.	Minor Equip-ment.	Building Supplies.	Publicity and Lectures.	Student Activity.	Commence-ment.	Miscel-laneous.	Total.
Dean's office,	\$199 49	\$229 51	\$1 14	\$61 70	-	\$1,471 40	\$1,059 07	\$444 61	-	\$491 84
Executive order,	-	-	1,811 62	-	-	-	-	-	\$1,511 12	6,297 82
President's office,	724 71	106 81	100 37	-	\$3 10	-	-	-	-	934 99
Registrar's office,	315 23	47 87	30 05	7 54	46	-	-	-	-	401 15
Treasurer's office,	486 29	353 23	155 09	20 70	40 72	-	-	-	62 50	1,118 53
Administration (salaries),	-	20,159 75	-	-	-	-	-	-	-	20,159 75
Totals,	\$1,725 72	\$20,897 17	\$2,098 27	\$89 94	\$44 28	\$1,471 40	\$1,059 07	\$444 61	\$1,573 62	\$29,404 08
MAINTENANCE.										
	Office Expense.	Labor.	Laboratory Supplies.	Refunds.	Minor Equip-ment.	Building Supplies.	Travel.	General Expense.	Salaries.	Totals.
Academic maintenance: --										
Agricultural economics,	\$50 91	\$94 33	\$4 78	-	\$22 75	-	\$10 05	-	-	\$182 82
Agricultural education,	250 04	33 51	104 18	\$228 25	8 25	-	54 71	-	-	678 94
Agronomy,	55 56	143 52	151 61	3 00	6 69	\$1 98	43 50	-	-	405 86
Animal husbandry,	59 42	102 55	54 68	-	24 44	5 39	68 62	-	-	315 10
Botany,	172 30	828 82	417 73	53 00	83 32	69 20	19 62	-	-	1,643 99
Chemistry,	132 49	750 52	2,639 68	654 27	93 19	130 05	20 70	-	-	4,420 90
Dairying,	127 48	513 24	5,623 61	-	181 07	104 54	61 41	-	-	6,611 35
Economics and sociology,	10 21	27 25	29 10	-	3 12	9 68	-	-	-	79 36
Entomology,	104 19	900 49	272 04	6 00	139 83	123 91	26 63	-	-	1,573 09
Farm administration,	153 11	49 76	53 39	-	67 38	-	42 65	-	-	366 29
Floriculture,	83 51	2,784 29	865 58	27 43	128 64	97 51	60 04	-	-	4,047 00
Forestry,	58 55	2 80	21 00	-	77 89	-	63 57	-	-	221 81
History and government,	21 99	10 63	1 92	-	-	-	3 00	-	-	37 54
Landscape gardening,	16 65	29 34	311 58	10 50	7 96	1 95	9 05	-	-	387 03
Language and literature,	51 22	58 24	97 43	-	91 96	1 84	-	-	-	300 69

[illegible]

CURRENT ACCOUNTS.

Disbursements and Receipts.

ACCOUNTS.	Disburse- ments from Dec. 1, 1912, to Nov. 30, 1913.	Receipts from Dec. 1, 1912, to Nov. 30, 1913.	Apportion- ment for Year ending Nov. 30, 1913.	Balance to Credit.
Administration:—				
Dean's office,	\$491 84	—	\$400 00	—\$91 84
Executive order,	6,297 82	—	6,200 00	—97 82
President's office,	934 99	\$4 20	1,000 00	69 21
Registrar's office,	401 15	—	400 00	—1 15
Salaries,	20,159 75	—	20,900 00	740 25
Treasurer's office,	1,118 53	11 27	1,100 00	—7 26
State Treasurer,	—	30,000 00	—	—
Maintenance:—				
Agricultural economics,	182 82	—	150 00	—32 82
Agricultural education,	678 94	250 99	300 00	—127 95
Agronomy,	405 86	109 08	200 00	—96 78
Animal husbandry,	315 10	30	275 00	—39 80
Botany,	1,643 99	734 90	500 00	—409 09
Chemistry,	4,420 90	2,784 75	1,800 00	163 85
Dairying,	6,611 35	4,549 40	2,300 00	238 05
Economics and sociology,	79 36	—	50 00	—29 36
Entomology,	1,573 09	191 97	1,225 00	—156 12
Farm administration,	366 29	33 85	300 00	—32 44
Floriculture,	4,047 00	3,320 64	1,200 00	473 64
Forestry,	221 81	—	300 00	78 19
History and government,	37 54	—	50 00	12 46
Landscape gardening,	387 03	489 10	100 00	202 07
Language and literature,	300 69	—	650 00	349 31
Market gardening,	3,633 23	2,131 12	2,400 00	897 89
Mathematics,	161 48	—	225 00	63 52
Microbiology,	449 31	210 00	400 00	160 69
Military science,	1,647 19	5 50	1,500 00	—141 69
Physical education,	754 88	142 50	550 00	—62 58
Physics,	403 43	2 30	350 00	—51 13
Pomology,	3,638 96	1,855 82	1,900 00	116 86
Poultry husbandry,	4,104 22	2,159 18	1,800 00	—145 04
Rural sociology,	27 86	—	50 00	22 14
Veterinary science,	1,917 50	21 65	750 00	—1,145 85
Zoölogy and geology,	581 09	333 10	250 00	01
Hospital account,	4,379 20	26 50	—	—4,352 70
Maintenance, general:—				
Equipment,	15,421 90	—	15,000 00	—421 90
Farm,	24,830 70	20,858 81	5,500 00	1,528 11
General horticulture,	3,735 20	1,425 67	2,300 00	—9 53
Graduate school,	33 25	—	100 00	66 75
Grounds,	2,937 01	3 08	3,250 00	316 07
Library,	6,523 60	561 25	5,800 00	—162 35
Operating and maintenance,	48,742 64	9,757 60	44,000 00	—4,742 64
State Treasurer, maintenance,	—	80,000 00	—	—
Endowment fund,	—	10,613 32	—	—
Instruction:—				
Salaries,	109,482 25	250 00	—	—
United States Treasurer:—				
Morrill fund,	—	16,666 66	—	—
Nelson fund,	—	16,666 67	—	—
State Treasurer:—				
Instruction,	—	75,000 00	—	—
	\$284,080 75	\$281,171 18	—	—
Balance beginning fiscal year Dec. 1, 1912,	—	19,288 62	—	—
Balance on hand Nov. 30, 1913,	16,379 05	—	—	—
	\$300,459 80	\$300,459 80	—	—

COLLEGE ACCOUNTS.

Comparative Disbursements and Receipts for 1912-13.

ACCOUNTS.	DISBURSEMENTS.		RECEIPTS.	
	1912.	1913.	1912.	1913.
Administration,	\$6,177 60	—	\$24 72	—
Agricultural economics,	102 11	\$182 82	—	—
Agricultural education,	1,266 84	678 94	122 62	\$250 99
Agronomy,	206 40	405 86	5 20	109 08
Agricultural division,	26,207 33	—	19,919 02	—
Animal husbandry,	264 01	315 10	3 89	30
Botany,	1,558 75	1,643 99	970 63	734 90
Chemistry,	3,958 87	4,420 90	2,648 23	2,784 75
Dairying,	205 80	6,611 35	20	4,549 40
Dean's office,	353 02	491 84	11 00	—
Economics and sociology,	48 35	79 86	—	—
Entomology,	1,359 83	1,573 09	263 99	191 97
Equipment,	—	15,421 90	—	—
Executive order,	—	6,297 82	—	—
Farm administration,	212 66	366 29	11 38	33 85
Farm,	—	24,830 70	—	20,858 81
Floriculture,	3,887 99	4,047 00	2,869 75	3,320 64
Forestry,	184 57	221 81	—	—
General agriculture,	537 28	—	51 63	—
General horticulture,	2,791 01	3,735 20	599 54	1,425 67
General maintenance,	63,093 90	—	22,094 07	—
Graduate school,	1 50	33 25	—	—
Grounds,	3,114 11	2,937 01	85	3 08
History and government,	19 93	37 54	—	—
Hospital,	—	4,379 20	—	26 56
Landscape gardening,	444 55	387 03	473 03	489 10
Language and literature,	544 37	300 69	—	—
Library,	6,591 12	6,523 60	590 40	561 25
Market gardening,	4,452 21	3,653 23	1,851 94	2,131 12
Mathematics,	209 81	161 48	—	—
Military,	1,547 43	1,647 19	—	5 50
Microbiology,	—	449 31	—	210 00
Physical education,	570 99	754 88	121 50	142 50
Physics,	227 94	403 43	—	2 30
Pomology,	3,502 47	3,638 96	1,233 52	1,855 82
Poultry husbandry,	3,214 79	4,104 22	1,235 41	2,159 18
President's office,	659 08	934 09	2 18	4 20
Registrar's office,	383 00	401 15	60	—
Rural sociology,	39 69	27 86	—	—
Salaries,	113,525 51	129,642 00	—	250 00
Treasurer's office,	891 20	1,118 53	6 88	11 27
Veterinary,	1,464 03	1,917 50	19 35	21 65
Zoology and geology,	571 58	581 09	329 69	333 10
Operating and maintenance,	—	48,742 64	—	9,757 60
State treasurer:—				
Endowment fund,	—	—	10,613 32	10,613 32
Maintenance,	—	—	58,000 00	80,000 00
Scholarship,	—	—	25,000 00	—
Instruction,	—	—	60,000 00	75,000 00
Administration,	—	—	—	30,000 00
United States Treasurer:—				
Morrill fund,	—	—	16,666 66	16,666 66
Nelson fund,	—	—	16,666 67	16,666 67
	\$254,391 63	\$284,080 75	\$242,407 87	\$281,171 18
Balance beginning fiscal year,	—	—	31,272 38	19,288 62
Balance on hand at close of fiscal year,	19,288 62	16,379 05	—	—
	\$273,680 25	\$300,459 80	\$273,680 25	\$300,459 80

Summary.

	Disbursements.	Receipts.
Cash on hand Dec. 1, 1912,	-	\$19,288 62
Institution receipts Nov. 30, 1913,	-	52,224 53
State Treasurer's receipts Nov. 30, 1913,	-	195,613 32
United States Treasurer's receipts Nov. 30, 1913,	-	33,333 33
Total disbursements,	\$284,080 75	-
Bills receivable Dec. 1, 1912, deducted,	\$284,080 75	\$300,459 80
Bills payable Dec. 1, 1912, deducted,	2,964 94	4,058 51
	\$281,115 81	\$296,401 29
Bills receivable Nov. 30, 1913,	-	3,827 63
Bills payable Nov. 30, 1913,	2,496 39	-
Balance,	16,616 72	-
	\$300,228 92	\$300,228 92

COLLEGE EQUIPMENT, 1913.

	Disbursements Fiscal Year.		Disbursements Fiscal Year.
Forestry,	\$118 10	Agronomy,	\$95 38
Farm,	479 27	Farm administration,	94 34
Dairy,	4,332 92	Floriculture,	186 36
Draper hall,	1,151 41	Landscape gardening,	145 02
Animal husbandry,	2,642 97	Pomology,	99 19
Poultry,	451 88	Botany,	29 70
Mathematics,	277 20	Chemistry,	200 00
Physical education,	168 67	Apiary,	57 30
Rural social science,	38 75	Physics,	144 56
Veterinary,	125 50	Zoology,	100 00
Entomology,	410 76	Microbiology,	3,216 42
Operating and maintenance,	189 92	Agricultural education,	26 00
Registrar's office,	482 25		
Dean's office,	158 03		\$15,421 90

FARM DISBURSEMENTS.

	Labor.	Equipment.	Feed.	Fertilizers.	Seeds.	Miscellaneous.	Supplies.	Improvements.	Totals.
Dairy,	\$1,066 43	\$197 39	—	—	—	—	\$1,538 07	—	\$2,801 89
Cattle,	3,592 87	—	\$4,859 85	—	—	\$1,667 11	—	—	10,119 83
Horses,	1,434 42	—	721 51	—	—	—	478 48	—	2,634 41
Swine,	395 68	—	431 53	—	—	252 06	—	—	1,079 27
Sheep,	113 63	—	4 60	—	—	—	10 67	—	128 90
Field crops,	2,208 48	—	—	\$1,139 12	\$263 16	101 33	—	—	3,712 09
Tools and machinery,	—	—	—	—	—	633 48	—	—	633 48
Miscellaneous,	2,909 34	—	—	—	—	36 79	—	\$774 70	3,720 83
	\$11,720 85	\$197 39	\$6,017 49	\$1,139 12	\$263 16	\$2,600 77	\$2,027 22	\$774 70	\$24,830 70

FARM CREDITS.

	Milk.	Stock.	Sundry.	Corn.	Hay.	Potatoes.	Roots.	Wool.	Labor.	Totals.
Dairy,	—	—	\$11 20	—	—	—	—	—	—	\$4,865 70
Swine,	\$4,854 50	\$873 01	1 00	—	—	—	—	—	—	874 01
Cattle,	10,219 20	1,748 76	451 48	—	—	—	—	—	—	12,419 44
Horses,	—	306 50	727 05	—	—	—	—	—	—	1,033 55
Field crops,	—	—	—	\$3 00	\$114 48	\$546 71	\$50 63	—	—	714 82
Miscellaneous,	—	—	136 18	—	—	—	—	—	\$798 01	934 19
Sheep,	—	—	—	—	—	—	—	\$17 10	—	17 10
	\$15,073 70	\$2,928 27	\$1,326 91	\$3 00	\$114 48	\$546 71	\$50 63	\$17 10	\$798 01	\$20,888 81

AGRICULTURAL DIVISION.

Disbursements and Receipts.

	Disbursements.	Receipts.
Agronomy,	\$405 86	\$109 08
Animal husbandry,	315 10	30
Dairying,	6,611 35	4,549 40
Farm,	24,830 70	20,853 81
Farm administration,	366 29	33 85
Poultry husbandry,	4,104 22	2,159 18
Division totals,	\$36,633 52	\$27,710 62

Summary.

	DR.	CR.
By total division receipts,		\$27,710 62
By bills receivable,		3,136 52
By net apportionment,		10,375 00
To total disbursements,	\$36,633 52	
To bills payable,	183 10	
To balance,	4,405 52	
	\$41,222 14	\$41,222 14

Inventory of Quick Assets.

	Nov. 30, 1912.	Nov. 30, 1913.
Inventory of produce,	\$7,010 93	\$6,431 98
Inventory of cattle,	11,143 00	11,935 00
Inventory of swine,	731 00	286 00
Inventory of horses,	4,090 00	5,150 00
Inventory of poultry,	1,524 15	1,598 70
Inventory of sheep,	200 00	443 00
	\$24,704 08	\$25,844 68

HORTICULTURAL DIVISION.

Disbursements and Receipts.

	Disbursements.	Receipts.
Floriculture,	\$4,047 00	\$3,320 64
Forestry,	221 81	-
General horticulture,	3,735 20	1,425 67
Grounds,	2,937 01	3 08
Landscape gardening,	387 03	489 10
Market gardening,	3,633 23	2,131 12
Pomology,	3,638 96	1,855 82
	\$18,600 24	\$9,225 43

Summary.

	Dr.	Cr.
By total division receipts,		\$9,225 43
By bills receivable,		381 17
By apportionment,		11,450 00
To total division disbursements,	\$18,600 24	
To bills payable,	20 30	
To balance,	2,436 06	
	\$21,056 60	\$21,056 60

Inventory of Quick Assets.

	Nov. 30, 1912.	Nov. 30, 1913.
Inventory of supplies,	\$621 25	\$713 25

EXPENSE OPERATING AND MAINTENANCE.

	Salaries.	Labor.	Fuel and Water.	Repairs.	Supplies.	Tools.	Architect.	Engineer.	Miscellaneous.	Total.
General:—										
General superintendent,	\$2,497 12	—	—	—	—	—	—	—	—	\$2,497 12
Office,	—	\$936 13	—	—	—	—	—	—	—	936 13
General expenses, . . .	—	—	—	—	\$1,885 14	—	—	—	—	1,885 14
Power plant:—										
Heating, . . .	—	4,063 70	\$19,739 76	\$773 94	102 56	—	—	—	—	24,679 96
Lighting, . . .	—	131 08	—	446 91	34 09	—	—	—	—	644 63
Tools, . . .	—	—	—	—	—	\$474 49	—	—	\$32 55	474 49
Expert services, . . .	—	—	—	—	—	—	—	\$57 61	—	57 61
Emergency maintenance,	—	—	—	—	—	—	—	—	—	—
Fire department, . . .	903 00	75 20	—	—	42 77	—	—	—	1,501 69	1,501 69
Roads, . . .	—	304 82	—	—	—	—	—	—	—	304 82
Night watch, . . .	—	1,224 48	—	—	—	—	—	—	—	1,224 48
Mail service, . . .	—	277 73	—	—	—	—	—	—	—	277 73
Waiting station janitor, . .	—	13 46	—	—	—	—	—	—	—	13 46
Water mains, . . .	—	91 94	—	—	—	—	—	—	—	91 94
Steam mains, . . .	—	327 88	—	—	—	—	—	—	—	327 88
Electric light circuit, . . .	—	322 28	—	—	—	—	—	—	—	322 28
Sewers and cesspools, . . .	—	20 04	—	—	—	—	—	—	—	20 04
Sundry, . . .	—	—	—	—	—	—	—	—	1,801 87	1,801 87
Amherst Water Company, . .	—	—	2,061 77	—	—	—	—	—	—	2,061 77
Totals, . . .	\$3,400 12	\$7,788 74	\$21,801 53	\$1,220 85	\$2,064 56	\$474 49	\$1,709 85	\$57 61	\$3,336 11	\$41,853 86

OPERATING AND MAINTENANCE EXPENSE — Continued.

COLLEGE BUILDINGS.		Electric Repairs.	Plumbing Repairs.	Heat Repairs.	C. and M. Repairs.	Janitors.	Bell Ringing.	Sundry.	Totals.
Animal husbandry,	.	—	\$0 63	\$0 28	\$7 47	—	—	—	\$8 38
Horse barn,	.	—	6 97	34 93	15	—	—	—	42 06
Dairy barn,	.	\$2 00	38 96	244 06	19 69	—	—	—	304 71
Young stock barn,	.	—	25 38	50	3 06	—	—	—	28 94
Power building,	.	12 53	29 76	5 87	632 95	\$90 86	—	—	771 97
Chemical building,	.	25 15	26 59	16 38	10 63	—	—	—	78 75
Poultry buildings,	.	6 07	3 14	2 32	4 98	—	—	—	16 51
Dairy building,	.	1 69	75 66	134 84	81 20	—	—	—	293 39
Drill hall,	.	8 40	9 96	53 78	9 81	—	—	—	81 95
Veterinary,	.	2 51	10 23	—	96 89	—	—	—	109 63
Apiary,	.	75	5 16	9 88	35 14	—	—	—	50 93
Mathematical building,	.	1 56	6 50	3 00	99 37	—	—	—	110 43
Entomology building,	.	13 04	53 23	19 39	77 85	—	—	—	163 51
Clark Hall,	.	17 15	36 63	—	1 78	—	—	—	55 56
French Hall,	.	34 93	1 08	10 43	15 94	—	—	—	62 38
Wilder Hall,	.	5 14	11 41	3 47	33 96	—	—	—	53 98
Upper plant house,	.	—	—	3 98	—	—	—	—	3 98
Old Durfee range,	.	1 25	25	1 82	—	—	—	—	3 32
Horticultural barns,	.	—	—	18	44 79	—	—	—	44 97
Physics building,	.	—	10 68	4 05	75 02	—	—	—	89 75
East experiment station,	.	—	4 71	32 27	11 14	—	—	—	48 12
West experiment station,	.	6 47	4 16	32 69	4 29	—	—	—	47 61
Experiment station barn,	.	—	34	99	64 46	—	—	—	65 79
P. and A. Chem. barn,	.	1 61	12 18	8 42	5 50	—	—	—	27 71
Pomology building,	.	46	—	—	1 62	—	—	—	2 08
Kellogg barn,	.	—	—	—	270 98	—	—	—	270 98
North College,	.	83 04	10 30	6 90	126 38	405 96	—	\$58 00	690 58
South College,	.	99 04	220 57	57 36	1,407 16	410 55	—	15 00	2,209 68
Chapel,	.	17 79	27 20	3 83	52 96	225 46	\$110 00	—	437 24
		\$340 58	\$631 68	\$691 62	\$3,195 18	\$1,132 83	\$110 00	\$73 00	\$6,174 89

EXPERIMENT STATION.

Disbursements and Receipts.

ACCOUNTS.	Disbursements from Dec. 1, 1912, to Nov. 30, 1913.	Receipts from Dec. 1, 1912, to Nov. 30, 1913.	Apportionment for Year ending Nov. 30, 1913.	Balance to Credit.
Administration,	\$860 79	\$4 54	\$1,600 00	\$743 75
Agricultural,	4,841 79	2,746 36	2,000 00	—95 43
Asparagus,	483 27	—	700 00	216 73
Botanical,	1,672 90	—	1,350 00	—322 90
Chemical,	9,362 54	9,128 76	400 00	166 22
Cranberry,	3,135 53	5,884 50	2,000 00	4,748 97
Entomological,	425 96	3 20	650 00	227 24
Fertilizer,	10,560 77	10,580 00	10,000 00	1,486 62
Freight,	248 24	56	300 00	52 32
Feed law,	6,184 05	6,000 00	6,000 00	897 40
Graves orchard,	466 93	399 04	400 00	332 11
Horticultural,	1,492 20	78 20	1,300 00	—114 00
Library,	64 00	—	75 00	11 00
Meteorology,	299 27	—	375 00	75 73
Poultry,	910 51	—	908 00	—2 51
Publications,	978 37	—	1,150 00	171 63
Salaries,	32,679 14	—	33,090 00	410 86
Treasurer's office,	373 27	—	300 00	—73 27
Veterinary,	718 02	—	725 00	6 98
Hatch fund,	—	15,000 00	—	—
Adams fund,	—	15,000 00	—	—
State fund,	—	15,000 00	—	—
	\$75,757 55	\$79,825 16	\$63,323 00	\$9,547 56 —608 11
Balance on hand beginning fiscal year Dec. 1, 1912,	—	3,084 29	—	—
Balance on hand Nov. 30, 1913,	7,151 90	—	—	—
	\$82,909 45	\$82,909 45	\$63,323 00	\$8,939 45

Comparative Disbursements and Receipts 1912-13.

ACCOUNTS.	DISBURSEMENTS.		RECEIPTS.	
	1912.	1913.	1912.	1913.
Administration,	\$1,690 19	\$860 79	\$2 94	\$4 54
Agriculture,	4,469 62	4,841 79	1,920 80	2,746 36
Asparagus,	733 84	483 27	—	—
Botanical,	1,127 23	1,672 90	6 17	—
Chemical,	9,397 06	9,362 54	8,980 25	9,128 76
Cranberry,	3,228 96	3,135 53	2,337 89	5,884 50
Entomology,	466 03	425 96	—	3 20
Fertilizer,	8,533 60	10,560 77	10,000 99	10,580 00
Freight,	275 76	248 24	80	56
Feed law,	4,345 00	6,184 05	3,750 00	6,000 00
Graves orchard,	676 33	466 93	30 00	399 04
Horticulture,	1,539 15	1,492 20	50	78 20
Library,	89 48	64 00	—	—
Meteorology,	397 05	299 27	—	—
Poultry,	247 55	910 51	—	—
Publications,	1,263 53	978 37	—	—
Salaries,	29,640 69	32,679 14	—	—
Treasurer's office,	253 18	373 27	—	—
Veterinary,	275 16	718 02	113 00	—
Hatch fund,	—	—	15,000 00	15,000 00
Adams fund,	—	—	15,000 00	15,000 00
State fund,	—	—	15,000 00	15,000 00
	\$68,649 41	\$75,757 55	\$67,643 34	\$79,825 16
Balance beginning fiscal year,	—	—	4,090 36	3,084 29
Balance on hand at close of fiscal year,	3,084 29	7,151 90	—	—
	\$71,733 70	\$82,909 45	\$71,733 70	\$82,909 45

Inventory of Quick Assets, Agricultural Department of Experiment Station.

Produce on hand Nov. 30, 1913, \$813 20

Analysis of Experiment Station Accounts.

	Adams Fund.	Feed Law.	Fertilizer Law.	Hatch Fund.	State Fund.	Totals.
Salaries,	\$11,853 34	\$4,133 69	\$6,595 32	\$10,437 44	\$10,221 70	\$43,241 49
Labor,	865 61	380 32	840 32	1,537 74	10,442 73	14,066 72
Publications,	—	—	842 25	798 78	182 00	1,823 03
Postage and stationery,	10 50	182 22	184 36	32 19	958 98	1,368 25
Freight and express,	13 01	—	52 90	75	283 93	350 59
Heat, light, water, power,	56 38	49 50	127 88	10 75	222 51	467 02
Chemical and laboratory supplies,	447 70	520 42	472 60	75 96	343 12	1,859 80
Seeds, plants and sundries,	144 65	26 58	41 41	239 84	1,089 61	1,542 09
Fertilizer,	74 02	—	39 40	657 02	296 41	1,066 85
Feeding stuffs,	—	—	—	87 30	1,919 48	2,005 78
Library,	14 08	11 43	39 66	48 05	219 01	332 23
Tools, machinery and ap- pliances,	4 08	166 79	12 21	109 01	522 00	814 09
Furniture and fixtures,	29 04	14 00	133 66	14 25	736 93	927 88
Scientific apparatus and specimens,	152 36	145 22	208 13	79 52	316 96	902 19
Live stock,	—	—	—	7 40	253 60	261 00
Traveling expense,	89 65	415 97	738 60	—	1,550 19	2,794 41
Contingent expenses,	—	105 90	100 00	—	555 00	760 90
Buildings and land,	223 45	32 01	132 07	54 42	730 28	1,172 23
	\$13,977 87	\$6,184 05	\$10,560 77	\$14,190 42	\$30,844 44	\$75,757 55

Summary.

	Disbursements.	Receipts.
Cash on hand Dec. 1, 1912,	—	\$3,084 29
Receipts from State Treasurer,	—	21,000 00
Receipts from United States Treasurer,	—	30,000 00
Receipts from other sources,	—	28,825 13
Total disbursements,	\$75,757 55	—
	\$75,757 55	\$82,909 45
Bills receivable Nov. 30, 1913,	—	785 49
Bills payable Nov. 30, 1913,	20 52	—
Balance,	7,916 87	—
	\$83,694 94	\$83,694 94

EXTENSION SERVICE.

Disbursements and Receipts.

	Disburse- ments.	Receipts.	Apportion- ment.	Balance.
Administration,	\$2,142 56	\$93 56	\$2,500 00	\$451 00
Agricultural education,	2,012 00	14 25	2,300 00	302 25
Auto. Dem. outfit,	1,545 27	—	1,700 00	154 73
Civic improvement,	171 23	—	500 00	328 77
Community field agent,	626 67	—	700 00	73 33
Conference rural social work,	488 84	3 00	700 00	214 16
Correspondence courses,	1,084 77	693 70	500 00	108 93
Dairy improvement,	714 92	27 75	700 00	12 83
Demonstration orchards,	1,180 63	19 38	1,200 00	38 75
Director's office,	2,728 68	70 55	2,100 00	—558 13
District field agent,	108 78	—	200 00	91 22
Farm management,	923 28	11 70	920 00	8 42
Home economics,	113 62	—	450 00	336 38
Itinerant instruction,	2,462 83	530 91	2,000 00	68 08
Library,	203 59	—	200 00	—3 59
M. A. C. Improvement Association,	245 65	109 22	200 00	63 57
Summer school,	3,120 77	902 99	3,000 00	782 22

Disbursements and Receipts — Concluded.

	Disbursements.	Receipts.	Apportionment.	Balance.
Poultry husbandry,	\$140 48	\$5 05	\$300 00	\$164 57
Reserve and emergency,	—	—	6,865 00	6,865 00
Salaries,	20,389 05	—	20,165 00	—224 05
Winter school,	5,894 03	3,489 15	2,800 00	395 12
From State Treasurer,	—	50,000 00	—	—
	\$46,297 65	\$55,971 21	\$50,000 00	\$10,459 33
Balance Dec. 1, 1912, overdrawn,	—	—2,896 35	—	—785 77
Balance Nov. 30, 1913,	6,777 21	—	—	—
	\$53,074 86	\$53,074 86	\$50,000 00	\$9,673 56

Summary.

	Disbursements.	Receipts.
Overdraft Dec. 1, 1912,	\$2,896 35	—
Receipts Nov. 30, 1913,	—	\$5,971 21
Received from State Treasurer,	—	50,000 00
Disbursements Nov. 30, 1913,	46,297 65	—
	\$49,194 00	\$55,971 21
Bills receivable Dec. 1, 1912, deducted,	—	101 37
Bills payable Dec. 1, 1912, deducted,	916 95	—
	\$48,277 05	\$55,869 84
Bills receivable Nov. 30, 1913,	—	133 29
Bills payable Nov. 30, 1913,	505 96	—
Balance,	7,220 12	—
	\$56,003 13	\$56,003 13

Analysis of Extension Service Disbursements.

	Travel.	Equipment.	Laboratory Expense.	Printing.	Office Supplies.	Instruction and Lectures.	Salaries.	Miscellaneous.	Totals.
Administration,	\$848 21	\$253 29	-	\$663 55	-	-	\$20,389 05	\$377 51	\$22,531 61
Director's office,	7 63	1,217 93	-	-	\$1,326 13	-	-	176 99	2,728 68
Demonstration orchards,	543 07	637 56	-	-	-	-	-	-	1,180 63
Correspondence courses,	34 29	-	-	-	1,047 48	-	-	3 00	1,084 77
Itinerant instruction,	15 38	-	-	-	-	\$2,447 45	-	-	2,462 83
Dairy improvement,	526 49	188 43	-	-	-	-	-	-	714 92
Agricultural education,	569 89	1,256 85	-	-	93 04	-	-	92 22	2,012 00
Farm management,	681 45	241 83	-	-	-	-	-	-	923 28
Poultry husbandry,	117 73	22 75	-	-	-	-	-	-	140 48
Civic improvement,	43 02	128 21	-	-	-	-	-	-	171 23
M. A. C. Improvement Association,	-	-	-	-	245 65	-	-	-	245 65
Community field agent,	556 11	70 56	-	-	-	624 56	-	-	626 67
Winter course,	-	-	\$3,736 77	26 75	-	-	-	2 50	4,388 08
Boys' and Girls' clubs,	-	-	-	-	-	944 26	-	-	944 26
Farmers' week,	-	-	-	-	-	233 17	-	-	233 17
Poultry,	-	-	-	-	-	-	-	-	128 06
Beekeepers' course,	-	-	-	-	-	-	-	-	233 17
Packing school,	-	-	-	-	-	-	-	-	135 00
Tree Warden's School,	-	-	-	-	-	62 96	-	-	62 96
Summer school,	-	-	-	-	-	2,352 41	-	-	3,120 77
Conference rural community leaders,	-	-	438 05	273 95	-	488 84	-	56 36	488 84
Library extension,	-	203 59	-	-	-	-	-	-	203 59
District field agent, Barnstable County,	-	108 78	-	-	-	-	-	-	108 78
Auto. Dem. outfit,	167 43	1,305 56	-	-	-	-	-	-	1,545 27
Home economics,	63 99	49 63	-	-	-	-	-	72 28	113 62
	\$4,174 09	\$5,684 97	\$4,174 82	\$964 25	\$2,712 30	\$7,153 65	\$20,389 05	\$1,043 92	\$40,297 05

SPECIAL APPROPRIATIONS.

NAME OF APPROPRIATION.	Date made.	Amount of Appropriation.	Amount previously expended.	Amount expended during Fiscal Year.	Amount expended to Date.	Amount received from State Treasurer.	Balance on Hand with State Treasurer.
Addition to Draper Hall,	1912	\$25,000 00	\$18,314 53	\$6,685 47	\$25,000 00	\$25,000 00	-
Architect's fees,	-	-	4,577 11	803 97	5,381 08	4,202 11	-
Dairy building,	1911	75,000 00	74,035 11	964 89	75,000 00	75,000 00	-
Farm buildings,	-	-	-	222 20	-	-	-
Special, 1912, miscellaneous,	1912	20,000 00	14,779 95	5,220 05	20,000 00	20,000 00	-
Special, 1912, repairs,	1912	15,000 00	8,128 84	6,871 16	15,000 00	15,000 00	-
Special, 1911, small buildings,	1911	15,000 00	14,774 35	225 65	15,000 00	15,000 00	-
Special, 1912, sewers,	1912	10,000 00	-	9,250 55	9,250 55	9,250 55	\$749 45
Special, 1913, improvements and repairs,	1913	26,000 00	-	16,550 55	16,550 55	16,550 55	9,449 45
Special, 1913, addition to French Hall,	1913	35,000 00	-	4,753 86	4,753 86	4,753 86	30,246 14
		\$221,000 00	\$134,609 89	\$51,548 35	\$185,936 04	\$184,757 07	\$40,445 04

INVENTORY — REAL ESTATE.

Land (Estimated Value).

Baker place,	\$2,500 00
Bangs place,	2,350 00
Clark place,	4,500 00
College farm,	37,000 00
Cranberry land,	11,063 00
Harlow farm,	3,284 63
Kellogg farm,	5,686 45
Louisa Baker place,	5,636 91
Old creamery place,	1,000 00
Pelham quarry,	500 00
Westcott place,	2,250 00
Allen place,	500 00
Charmbury place,	450 00
Loomis place,	415 00
Hawley & Brown place,	675 00
Newell farm,	2,800 00

 \$80,792 99
College Buildings (Estimated Value).

Apiary,	\$3,000 00
Animal husbandry building,	10,000 00
Chemical laboratory,	8,000 00
Clark hall,	67,500 00
Cold-storage laboratory,	12,000 00
Dairy building,	75,000 00
Dairy barn and storage,	30,000 00
Dining hall,	60,000 00
Drill hall and gun shed,	10,000 00
Durfee range and glass houses, old,	10,000 00
Durfee range and glass houses, new,	15,000 00
Entomology building,	80,000 00
Farmhouse,	25,000 00
French hall,	17,000 00
Horse barn,	5,000 00
Horticultural barn,	2,500 00
Horticultural tool shed,	2,000 00
Machinery barn,	4,000 00
Mathematical building,	6,000 00
North dormitory,	25,000 00
Physics laboratory,	5,500 00
Poultry breeding house,	600 00
Poultry brooder house,	1,000 00
Poultry incubator cellar and demonstration building,	1,400 00
Poultry laboratory,	1,300 00
Poultry laying house,	1,800 00
Poultry mechanics and storage building,	1,900 00
Power plant and storage building,	18,500 00
President's house,	12,000 00
Quarantine barn,	200 00
Sheep shed,	1,400 00
Small plant house, with vegetable cellar and cold grapery,	4,700 00
South dormitory,	35,000 00

Stone chapel,	\$30,000 00
Three houses on Stockbridge Road,	5,000 00
Veterinary laboratory and stable,	23,500 00
Waiting station,	500 00
Wilder hall,	37,500 00
Young stock barn,	6,500 00
	<hr/>
	\$632,800 00

College Equipment (Estimated Value).

Administrative division: —

Dean's office,	\$347 53
President's office,	876 70
Registrar's office,	877 10
Treasurer's office,	1,963 41

Agricultural division: —

Agronomy,	1,541 23
Animal husbandry,	834 97
Dairy,	12,067 19
Farm administration,	1,271 05
Farm department,	30,081 37
Poultry,	4,221 80
Dining hall,	5,311 30
Extension department,	4,432 68

General science: —

Apiary,	1,544 55
Botanical,	8,544 82
Chemical,	10,802 30
Entomology,	6,183 11
Microbiology,	5,107 71
Mathematics,	2,740 50
Physics,	3,536 94
Veterinary,	9,252 30
Zoological laboratory,	9,201 87
Zoological museum,	6,511 05
History and political science,	20 75
Graduate school,	30 05

Horticultural division: —

Floriculture,	6,881 34
Forestry,	1,187 12
General horticulture,	9,549 05
Grounds,	514 35
Landscape gardening,	4,812 23
Market gardening,	1,209 57
Pomology,	4,081 26

Humanities, division of: —

Economics and sociology,	97 87
Language and literature,	279 85

Library,	72,608 85
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Military,	1,492 42
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Operating and maintenance: —

College supply,	290 85
Fire apparatus,	1,490 50
General maintenance,	74,063 63
Equipment,	\$66,828 06

Operating and maintenance — *Con.*

Carpentry and masonry supplies,	\$2,003 62	
Electrical supplies,	1,580 28	
Heating and plumbing supplies,	2,956 50	
Painting supplies,	695 17	
Janitors' supplies,		278 67
Sewer line,		8,000 00
Water mains,		8,282 00
Physical education,		2,426 19
Rural social science: —		
Agricultural economics,		353 00
Agricultural education,		834 91
Rural social service,		101 75
Textbooks,		546 89
Trophy room,		1,617 10

\$328,301 68

Experiment Station Buildings (Estimated Value).

Agricultural laboratory,	\$15,000 00
Agricultural barns,	5,000 00
Agricultural farmhouse,	1,500 00
Agricultural glass house,	500 00
Cranberry buildings,	2,800 00
Plant and animal chemistry laboratory,	30,000 00
Plant and animal chemistry barns,	4,000 00
Plant and animal chemistry dairy,	2,000 00
Six poultry houses,	600 00
Entomological laboratory and glass house,	850 00

\$62,250 00

Experiment Station Equipment (Estimated Value).

Agricultural laboratory,	\$6,443 79
Botanical laboratory,	5,469 26
Chemical laboratory,	18,297 17
Cranberry station,	2,867 70
Director's office,	3,676 61
Entomological laboratory,	23,457 05
Horticultural laboratory,	1,788 00
Meteorology laboratory,	1,102 00
Poultry department,	1,429 25
Treasurer's office,	724 00
Veterinary laboratory,	65 00

\$65,319 83

Inventory Summary.

Land,	\$80,792 99
College buildings,	632,800 00
College equipment,	328,301 68
Experiment station buildings,	62,250 00
Experiment station equipment,	65,319 83

\$1,169,464 50

STUDENTS' TRUST FUND ACCOUNTS.

	Disburse- ments for Year ending Nov. 30, 1913.	Receipts for Year ending Nov. 30, 1913.	Balance on Hand Nov. 30, 1913.	Balance brought for- ward Dec. 1, 1912.
Athletics,	\$8,804 19	\$8,360 53	\$2,305 69	\$2,749 35
"College Signal,"	1,961 63	1,768 75	415 95	608 83
Harlow Farm,	107 12	248 20	—	—141 08
Kellogg Farm,	376 98	352 41	—	24 57
Draper hall,	50,900 06	51,866 36	223 51	—742 79
Keys,	36 50	74 00	69 25	31 75
Student deposits,	9,092 16	9,688 07	2,477 65	1,881 74
Textbooks,	5,376 43	5,415 72	466 22	426 93
Uniforms,	2,854 21	4,355 96	4,135 40	2,633 65
1913 index,	302 50	281 50	7 42	28 42
1914 index,	1,553 01	1,533 40	5 36	24 97
1915 index,	67 58	104 50	36 92	—
Social Union,	773 06	681 91	531 77	622 92
Track suits,	328 05	328 05	—	—
	\$82,533 48	\$85,059 36	\$10,675 14	\$9,033 13
Balance on hand Dec. 1, 1912,	—	8,149 26	—	—883 87
Balance on hand Nov. 30, 1913,	10,675 14	—	—	—
	\$93,208 62	\$93,208 62	\$10,675 14	\$8,149 26

DETAILED STATEMENT OF THE DINING HALL.

	Liabilities.	Resources.
Dec. 1, 1912, overdraft,	—\$742 79	—
Nov. 30, 1913, total disbursements,	50,900 06	—
Nov. 30, 1913, outstanding bills,	1,983 05	—
Nov. 30, 1913, total collections,	—	\$51,866 36
Nov. 30, 1913, accounts outstanding,	—	387 88
Nov. 30, 1913, inventory,	—	2,364 43
Nov. 30, 1913, balance,	992 77	—
	\$54,618 67	\$54,618 67

ENDOWMENT FUND.¹

	Principal.	Income.
United States grant (5 per cent.),	\$219,000 00	\$7,300 00
Commonwealth grant (3½ per cent.),	142,000 00	3,313 32
		\$10,613 32

¹ This fund is in the hands of the State Treasurer, and the Massachusetts Agricultural College receives two-thirds of the income from the same.

BENEFICIARY FUNDS.

Burnham Emergency Fund.

	Market Value Dec. 1, 1913.	Par Value.	Income.
Two bonds American Telephone and Telegraph Company 4s, at \$850,	\$1,700 00	\$2,000 00	\$80 00
Two bonds Western Electric Company 5s, at \$1,000,	2,000 00	2,000 00	100 00
	\$3,700 00	\$4,000 00	\$180 00
Overdraft Dec. 1, 1912,	—	—	—219 45
Overdraft Nov. 30, 1913,			—\$39 45

Library Fund.

Five bonds New York Central & Hudson River Railroad Company 4s, at \$880,	\$4,400 00	\$5,000 00	\$200 00
Five bonds Lake Shore & Michigan Southern Railroad Company 4s, at \$900,	4,500 00	5,000 00	200 00
Two shares New York Central & Hudson River Railroad Company stock, at \$96,	192 00	200 00	10 50
Amherst Savings Bank, deposit,	167 77	167 77	6 18
	\$9,259 77	\$10,367 77	\$416 68
Transferred to college library account,	—	—	416 68

SPECIAL FUNDS.

Endowed Labor Fund (the Gift of a Friend of the College).

Two bonds American Telephone and Telegraph Company 4s, at \$850,	\$1,700 00	\$2,000 00	\$80 00
Two bonds Lake Shore & Michigan Southern Railroad Company 4s, at \$900,	1,800 00	2,000 00	80 00
One bond New York Central Railroad debenture 4s,	880 00	1,000 00	40 00
Amherst Savings Bank, deposit,	143 39	143 39	5 72
One bond Metropolitan Street Railway, Kansas City, Company 5s, at,	940 00	1,000 00	50 00
	\$5,463 39	\$6,143 39	\$255 72
Unexpended balance Dec. 1, 1912,	—	—	503 11
Cash on hand Dec. 1, 1913,	—	—	\$758 83

Whiting Street Scholarship Fund.

One bond New York Central debenture 4s,	\$880 00	\$1,000 00	\$40 00
Amherst Savings Bank, deposit,	271 64	271 64	10 84
	\$1,051 64	\$1,271 64	\$50 84
Unexpended balance Dec. 1, 1912,	—	—	46 31
	—	—	\$97 15
Disbursements for scholarships for fiscal year ending Nov. 30, 1913,	—	—	12 50
Cash on hand Dec. 1, 1913,	—	—	\$84 65

Hills Fund.

	Market Value Dec. 1, 1913.	Par Value.	Income.
One bond American Telephone and Telegraph Company 4s, at	\$850 00	\$1,000 00	\$40 00
One bond New York Central & Hudson River Railroad debenture 4s, at	880 00	1,000 00	40 00
One bond New York Central & Hudson River Railroad debenture 3½s, at	780 00	1,000 00	35 00
Two bonds Metropolitan Street Railway of Kansas City 5s, at \$940,	1,880 00	2,000 00	100 00
Three bonds Pacific Telephone and Telegraph Company 5s, at \$960,	2,880 00	3,000 00	150 00
One bond Western Electric Company 5s, at	1,000 00	1,000 00	50 00
Boston & Albany Railroad stocks, 3¾ shares, at \$200,	725 00	362 50	31 68
Amherst Savings Bank, deposit,	72 75	72 75	2 88
Electric Securities Company bonds, 1½, at \$1,000,	1,180 00	1,180 00	59 00
Electric Securities Company bonds exchanged for series No. 12,	—	—	35 40
	\$10,247 75	\$10,615 25	\$543 96
Unexpended balance Dec. 1, 1912,	—	—	112 58
	—	—	\$656 54
Disbursements by floriculture and botanical departments for fiscal year ending Nov. 30, 1913,	—	—	112 20
Cash on hand Dec. 1, 1913,	—	—	\$544 34

Mary Robinson Fund.

Boston & Albany Railroad stock, ¾ share at \$200,	\$75 00	\$38 00	\$3 32
Electric Securities Company bonds, 4½, share at \$1,000,	820 00	820 00	41 00
Electric Securities Company bonds, exchanged for series No. 12,	—	—	24 60
	\$895 00	\$858 00	\$68 92
Unexpended balance Dec. 1, 1912,	—	—	99 40
	—	—	\$168 32
Disbursements for fiscal year ending Nov. 30, 1913,	—	—	43 00
Cash on hand Dec. 1, 1913,	—	—	\$125 32

Grinnell Prize Fund.

Ten shares New York Central & Hudson River Railroad stock, at \$96,	\$960 00	\$1,000 00	\$50 00
Unexpended balance Dec. 1, 1912,	—	—	195 74
	—	—	\$245 74
Disbursements for prizes,	—	—	50 00
Cash on hand Dec. 1, 1913,	—	—	\$195 74

Massachusetts Agricultural College (Investment).

One share New York Central & Hudson River Railroad stock,	\$96 00	\$100 00	\$5 00
Unexpended balance Dec. 1, 1912,	—	—	60 45
Cash on hand Dec. 1, 1913,	—	—	\$65 45

Gassett Scholarship Fund.

	Market Value Dec. 1, 1913.	Par Value.	Income.
One bond New York Central & Hudson River Railroad debenture 4s,	\$880 00	\$1,000 00	\$40 00
Amherst Savings Bank, deposit,	11 64	11 64	44
	\$891 64	\$1,011 64	\$40 44
Unexpended balance Dec. 1, 1912,	-	-	30 95
Cash on hand Dec. 1, 1913,	-	-	\$71 39

Danforth Keyes Bangs Fund.

Two bonds Pacific Telephone and Telegraph Company 5s, at \$960,	\$1,920 00	\$2,000 00	\$100 00
Two bonds Union Electric Light and Power Company 5s, at \$950,	1,900 00	2,000 00	100 00
Two bonds American Telephone and Telegraph Company 4s, at \$850,	1,700 00	2,000 00	80 00
Interest from student loans,	-	-	16 83
	\$5,520 00	\$6,000 00	\$296 83
Unexpended balance Dec. 1, 1912,	-	-	402 02
	-	-	\$698 85
Total loans made to students during fiscal year, \$1,084 75			
Cash received on account of student loans, 766 25			
Excess of loans made, over accounts paid by students,			318 50
Cash on hand Dec. 1, 1913,			\$380 35

John C. Cutter Fund.

One bond Pacific Telephone and Telegraph Company 5s,	\$960 00	\$1,000 00	\$50 00
Unexpended balance Dec. 1, 1912,	-	-	74 72
	-	-	\$124 72
Disbursements for fiscal year to date,	-	-	111 60
Cash on hand Dec. 1, 1913,	-	-	\$13 12

SUMMARY OF BALANCES ON HAND OF THE INCOME FROM FUNDS HELD IN
TRUST BY THE MASSACHUSETTS AGRICULTURAL COLLEGE.

Endowed labor fund,	\$758 83
Whiting Street scholarship fund,	84 65
Hills fund,	544 34
Mary Robinson fund,	125 32
Grinnell Prize fund,	195 74
Gassett scholarship fund,	71 39
Massachusetts Agricultural College investment fund,	65 45
Danforth Keyes Bangs fund,	380 35
John C. Cutter fund,	13 12
	<hr/>
	\$2,239 19
Burnham emergency fund overdraft,	39 45
	<hr/>
	\$2,199 74

I hereby certify that I have this day examined the Massachusetts Agricultural College account, as reported by the treasurer, Fred C. Kenney, for the year ending Nov. 30, 1913. All bonds and investments are as represented in the treasurer's report. All disbursements are properly vouched for, and all cash balances are found to be correct.

CHARLES A. GLEASON,

Auditor.

AMHERST, Dec. 15, 1913.

HISTORY OF SPECIAL FUNDS.

Burnham emergency fund:—

A bequest of \$5,000 from T. O. H. P. Burnham of Boston, made without any conditions. The trustees of the college directed that \$1,000 of this fund should be used in the purchase of the Newell land and Goessmann library. The fund now shows an investment of \$4,000 00

Library fund:—

The library of the college at the present time contains about 41,000 volumes. The income from the fund raised by the alumni and others is devoted to its increase, and additions are made from time to time as the needs of the different departments require. Dec. 27, 1883, William Knowlton gave \$2,000; Jan. 1, 1894, Charles L. Flint gave \$1,000; in 1887 Elizur Smith of Lee, Mass., gave \$1,215. These were the largest bequests, and now amount to 10,000 00

Endowed labor fund:—

Gift of a friend of the college in 1901, income of which is to be used for the assistance of needy and deserving students, 5,000 00

Whiting Street scholarship:—

Gift of Whiting Street of Northampton, for no special purpose, but to be invested and the income used.

This fund is now used exclusively for scholarship, . . . \$1,000 00

Hills fund:—

Gift of Leonard M. and Henry F. Hills of Amherst, Mass., in 1867, to establish and maintain a botanic garden, 10,000 00

Mary Robinson fund:—

Gift of Miss Mary Robinson of Medfield, in 1874, for scholarship, 1,000 00

Grinnell prize fund:—

Gift of Hon. Wm. Claflin, to be known as the Grinnell agricultural prize, to be given to the two members of the graduating class who may pass the best oral and written examination in theory and practice of agriculture, given in honor of George B. Grinnell of New York, 1,000 00

Gassett scholarship fund:—

Gift of Henry Gassett of Boston, the income to be used for scholarship, 1,000 00

Massachusetts Agricultural College investment fund:—

Investment made by vote of trustees in 1893; to purchase one share of New York Central & Hudson River Railroad stock. The income from this fund has been allowed to accumulate, 100 00

Danforth Keyes Bangs fund:—

Gift of Louisa A. Baker of Amherst, Mass., April 14, 1909, the income thereof to be used annually in aiding poor, industrious and deserving students to obtain an education in said college, 6,000 00

John C. Cutter fund:—

Gift of Dr. John C. Cutter of Worcester, Mass., an alumnus of the college, who died in August, 1909, to be invested by the trustees, and the income to be annually used for the purchase of books on hygiene, 1,000 00

\$41,100 00

PRIZES.

Sophomore prize in botany, given by Prof. A. V. Osmun of the department of botany to that member of the sophomore class who presents the best herbarium in the regular course (this prize was first offered in 1908 with the hope that it might stimulate a greater interest on the part of the students in this line of work), \$5 00

Special prize, given by the Western Alumni Association to that member of the sophomore class who during his first two years has shown the greatest improvement in scholarship, character and example,	\$25 00
Animal husbandry. The F. Lothrop Ames prize, given by F. Lothrop Ames, Langwater Farms, North Easton, Mass., consisting of \$150 a year, offered for a period of five years, to be given to the three students standing highest in the work of advanced live stock judging, and to be used in defraying their expenses incurred by participation in the students' judging contest at the National Dairy Show, Chicago. Given in May, 1912, available first in autumn of 1912, and for the four succeeding years,	150 00
	<hr/>
	\$180 00

FRED C. KENNEY,
Treasurer.

MASSACHUSETTS AGRICULTURAL COLLEGE



Agricultural Vocations

MASSACHUSETTS

AGRICULTURAL COLLEGE



The M. A. C. Bulletin

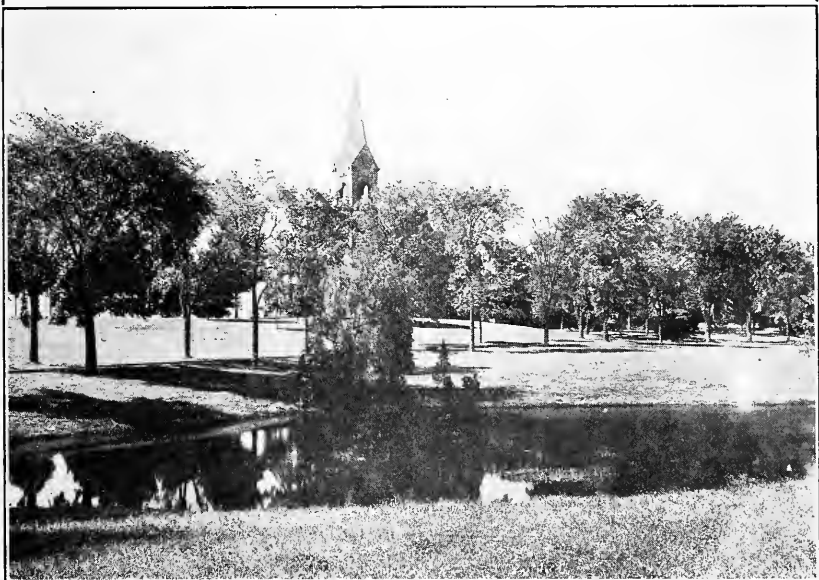
AMHERST, MASS.



Volume VI

March 1914

Number 3

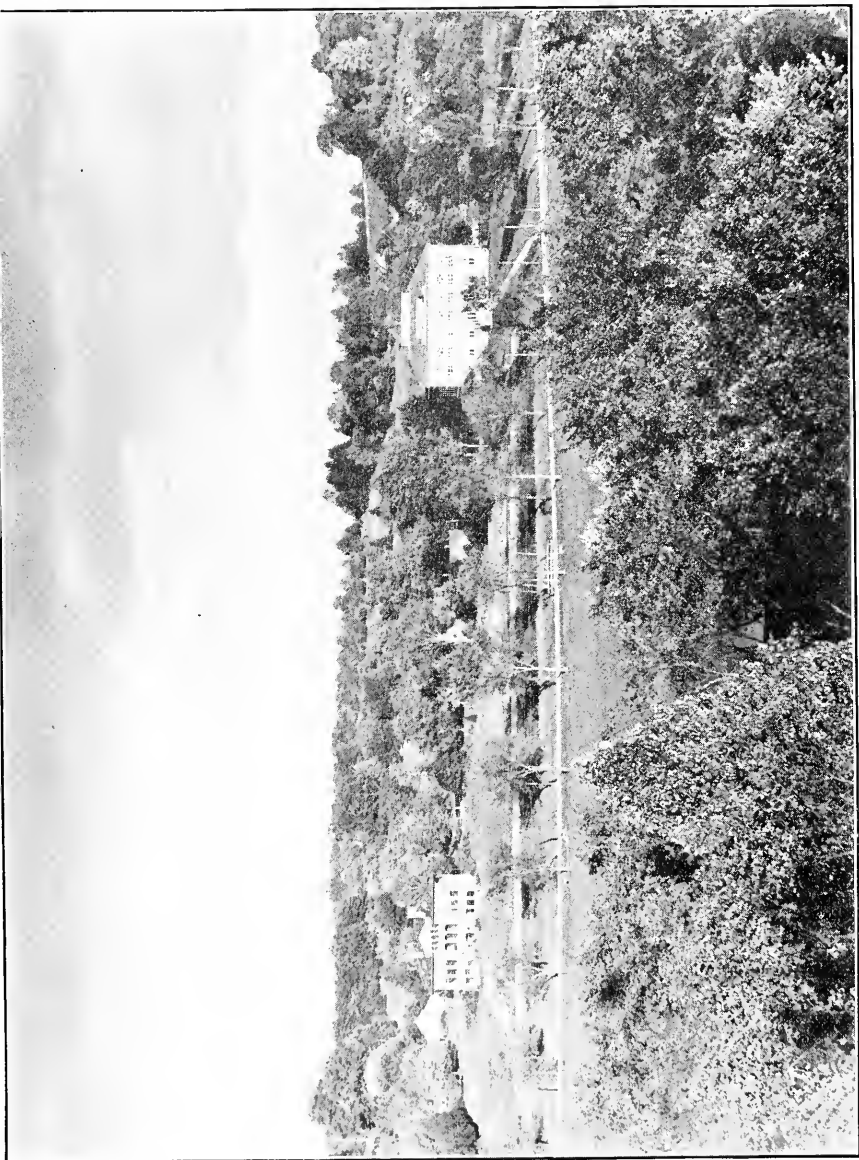


Chapel and Library

Published Six Times a Year by the
MASSACHUSETTS AGRICULTURAL COLLEGE

January, February, March, May, September, October

Entered as second class matter at the Post Office, Amherst, Mass.



East Side of the Campus

Foreword



UNTIL comparatively recent years few men ambitious for a college course supposed that they could find a satisfying career in connection with agriculture. Today, the call for men to serve in varied and important places in the agricultural field is beyond the ability of the agricultural colleges to supply. These pages are intended to outline some of the most attractive and significant of these new openings for able young men, and to advise with reference to the educational training necessary.

Not long ago, the writer of a book about college life and work stated that the main business of the college is to train "problem-solvers." I like the words. They suggest definite work to be done in the world, big work, hard work, useful work. They appeal to men of force and will, and to men who want to make their lives count not alone for themselves, but for the world's welfare. So I like to think that the main mission of the modern agricultural college is to train men to become rural problem-solvers. And now these problems keep arising — knotty, interesting, important problems of human wealth and welfare that can be solved only by men — trained men.

There are the practical problems of producing adequate food for the city dwellers, of making farming "pay" by the use of modern methods. A rapidly increasing number of agricultural college graduates are ambitious to prove that practical agriculture — right here in New England, too — offers a real career for a brainy, alert, ambitious, college man. And they are proving it.

There are the problems of farm business, farm management, buying and selling to advantage. Men who have the business instinct are finding in this field problems "worthy their steel." There are big economic problems to be solved: rural credit, farm labor, the great tenant-farming question. There are engineering problems: irrigation, machinery, use of power, roads, public sanitation.

There are social and moral problems: making better schools, the education of adult farmers, the building up of the country church to its rightful place of leadership, the fascinating work of the rural Young Men's Christian Association, the recreative side of rural life,

rural home life and district nursing for women, and the wonderful fields of scientific investigation.

These are but hints of the great and increasing multitude of rural problems to be solved. Their solution is vital, not alone to our country-life involving its fifty millions of people, and to our largest industry with its forty billions of invested wealth, but vital also to the national prosperity and welfare.

The solution of these interesting and important problems awaits the problem-solvers — the rural-problem-solvers. They are coming out of our agricultural colleges every year in greater numbers. They are finding fascinating opportunities, fair financial reward, a chance to “lend a hand” in building our American life, and no end of good hearty work for full-blooded men. This work is not for all men. It means accurate knowledge of rural affairs, the willingness to work hard, the desire to serve, the belief in the importance of the task. For men who hear the call to become rural-problem-solvers, the fields are white already unto harvest.

KENYON L. BUTTERFIELD,

President Massachusetts Agricultural College.



Farm and Farm Buildings

Agronomy

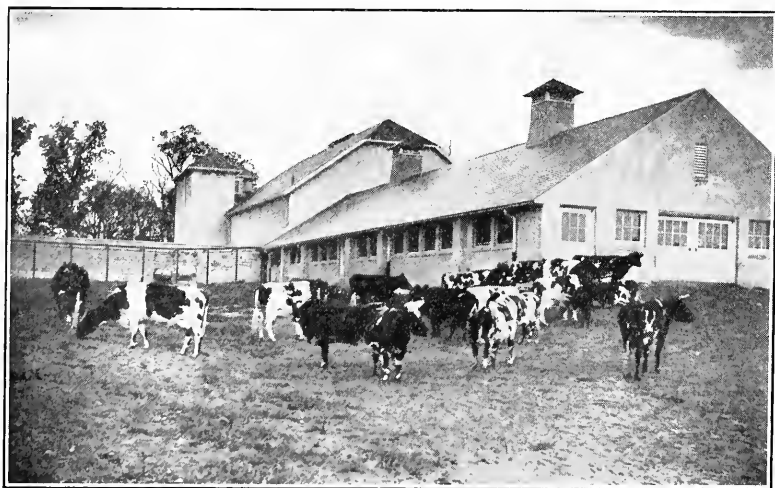
The Massachusetts Agricultural College is peculiarly well located for the study of soils, and for the study of different forms of agriculture in their effects on soil fertility. According to the survey of the United States Department of Agriculture there are located in the Connecticut Valley fourteen distinct soil types. Twelve of these are within easy walking distance of the college, and are studied in those courses given by the department of agronomy. On these several types of soil are found many different forms of agriculture, varying from those semi-abandoned farms which were allowed to run wild after grain production became unprofitable half a century ago, and now in some cases being taken up for orcharding, to well-developed dairy and general farms, and to intensively cultivated onion and tobacco farms. Since there are in this region no extensive grain and stock farms, students specializing in agronomy are advised to spend at least one summer before graduation on a farm of this kind in some one of the middle western states.

The aim of the college through its department of agronomy is to train teachers and investigators in soil fertility and crop production. The subject is now usually separated into two parts, so that there are two distinct groups of requirements for the trained agronomist: for specialists in soil fertility, which requires a working knowledge of geology, chemistry, and soil microbiology; and for specialists in crop

production particularly as related to the great staple food, forage, and fibre crops, requiring a basic knowledge of chemistry, botany, plant pathology, and plant breeding. Both sub-divisions require the fullest farm experience on the part of the student so that it is advisable, in case one has not had the benefit of such training, that he obtain it as quickly and as thoroughly as possible — preferably before he enters the college. Moreover, since the amount of scientific knowledge required is large, the student choosing agronomy must have a natural love for the sciences and must be willing later on to do enough post-graduate work to perfect his preparation in his chosen branch of the subject.

The demand for men comes mainly from the different state experiment stations, from the fertilizer companies, and from the United States Department of Agriculture. The field is developing so rapidly that there is a growing demand for highly trained men, but it is almost impossible to get this training within the limits of a four years' course. Graduate work will usually be necessary before the student can fill the larger and better paid positions.

Since agronomy concerns itself chiefly with the underlying principles governing crop production, it is not an end in itself and those students desiring to prepare themselves for a practical vocation are advised to elect considerable work in other agricultural departments of the college.



College Live Stock

Animal Husbandry

The animal husbandry department of the Massachusetts Agricultural College endeavors to insure a scientific yet practical training in the various lines of work pertaining to the successful production of live stock and to the successful management of farms devoted to live stock production. The students are given lectures and laboratory work relating to the market grades and classes of horses, cattle, sheep, and swine. This is followed by a study of the origin, history, adaptations, and the type of the various breeds of stock, especially of dairy cattle, draft horses, sheep, and swine. This instruction is accompanied by the study of representatives of the various breeds supplemented by visits to herds of superior cattle. Animal nutrition, the composition of feed stuffs and their characteristics and uses are fully studied; likewise the feeding, care, housing, and management of horses, cattle, sheep, and swine, emphasis being given to the raising of young stock, the care of breeding stock, economic milk production, profitable pork production, the possibilities of beef making, and the breeding and feeding of work stock. The development of the various breeds of live stock in America is reviewed with a study of the methods of breeding and management of the most successful breeders. Principles and practices of breeding are studied and application made of the most recent achievements of the research laboratories of the country in their bearing upon live stock production.

Combined with these specific animal studies are those in the handling of milk, the production of crops, the study and management of the soil, and farm management. The broader experience which many students need, however, cannot be given in a college course. To meet this need the animal husbandry department arranges for summer work upon superior live stock farms.

The courses as here outlined are intended to prepare men for the successful production of live stock and live stock products upon farms of their own; this is the main purpose of the course and herein lies the greatest opportunity. Men who have completed this major, with the summer work accompanying it, are equipped to be efficient herdsmen and breeders, and after devoting a year or two as assistants to good managers they should be fit for responsible managerial positions.

The field for capable live stock men has never offered greater opportunities. Better prices never prevailed for superior pure bred stock or for live stock products. For the young man who knows type, who can breed and feed to secure high economic production and to perpetuate it through successive generations, a place of wide influence and distinctive service with its financial accessories is waiting. Business and professional men more and more are making their homes in agricultural sections and instituting in connection with them live stock farms; these men must secure capable and efficient managers and foremen. Massachusetts needs more milk of higher quality — more milch cows of superior individuality; hundreds of thousands of dollars are spent every year by the State for western work horses, beef, pork, and mutton; thousands of acres are growing to brush that might be producing the finest meats. Surely here are real opportunities for the college trained man of knowledge and skill in practice.

In addition to the practical vocations, there is an increasing demand for men who can teach the fundamentals pertaining to live stock in colleges and agricultural high schools. There is a growing demand for men who can assume positions of leadership in county and township organizations where the work consists in improving the live stock industries and the agricultural pursuits of the population. Experiment stations call for many men for the investigation and discovery of principles and the advancement of the sciences in relation to the feeding and breeding of live stock.

Additional opportunities for profitable employment lie in governmental employ; each year sees new lines of work instituted by the national government as well as expansion of old. For the direction and prosecution of this work college men are especially fitted and largely utilized.

Thus, whether a man wishes to serve and achieve success upon his own resources privately, or in a public capacity as teacher in county, state or other institutions, or as an investigator, there is abundance of opportunity in animal husbandry.



Flint Laboratory—Dairy Instruction Building

Dairying

The dairy department at the Massachusetts Agricultural College gives instruction in the handling of milk, and in the making of dairy products. Instruction concerning dairy cattle, as to selection, breeding, and feeding is given by the animal husbandry department. There is a close relationship between these two subjects in New England, and there is a close relationship between the two departments in fitting men to handle the problems as found on the New England dairy farms. Probably the most attractive opportunities today in dairying are for men who fit themselves to work either for themselves or as superintendents for others. Men desiring to do this should remember that their agricultural college is engaged primarily in giving theoretical training, and that a man must secure practical experience under competent managers before securing the best positions.

A particular line of work that is now developing is for supervisors in county work and teaching in agricultural high schools. Men who are now engaged in this work emphasize the need of dairy knowledge and experience, as so much of our New England farming is for milk, cream, and butter production.

In addition there is a field for a limited number of men for college teachers, experiment station workers, and in work for the large milk handling and dairy products manufacturing companies.

The dairy department is now using Flint Laboratory, the new instruction building, which is one of the best equipped dairy instruction plants in the country. Certified milk is produced on the college farm; the certified plant is used for instructional purposes.



Dairy Barn

Farm Management

There are four important factors that have an influence on success in farming in the eastern part of the United States. They are (1) training or knowledge of the business; (2) practical experience; (3) capital; (4) a fondness for country life. The agricultural college can help supply only the first of these, while the second and third are equally as important for the success of agricultural enterprises. Even with all these factors present farming does not offer the best means for acquiring great wealth. It does, however, in a unique fashion, provide opportunity for a safe investment, a good living, a good home, the exercise of influence and leadership, and the well-balanced use of both mental and physical abilities. For those students who do not wish to become independent operators, there is a fairly steady demand for well-trained men with practical experience as farm superintendents

and managers. There are also in New England many farms and estates owned by wealthy men for recreation or as summer homes, that call for competent supervision.

The organization of separate departments of farm administration or farm management in the agricultural colleges of the country is comparatively recent and for some time to come there is likely to be a demand for good teachers of this subject. The present demand for more extension and demonstration work and the establishment of farm bureaus and county advisers all over the country also offers increased opportunities for well-trained men. In all these departments practical experience is essential to success, and the student who intends to specialize in farm management should take every opportunity that occurs of working on good farms, whether it be before, during, or after his college course.

The Massachusetts Agricultural College is well prepared to supply the necessary training for general agriculture and for farm management. Instruction is given in farm accounting, dairying, animal husbandry, poultry husbandry, fruit growing, soils, fertilizers, and crops. Its large farm equipped with modern buildings, its poultry plant, dairy, and orchards, present great opportunities for acquiring a comprehensive knowledge of farming.

Poultry Husbandry

Probably no state in the Union offers opportunities in poultry culture comparable with those in Massachusetts. In the first place here are the best markets in the country. We have easy access to the great eastern commercial centers of Boston and New York. Furthermore, being situated outside of the great egg-producing sections of the country, competition must come from a considerable distance.

Compared with some sections of the country, the climate in Massachusetts is very favorable to poultry culture. There are neither the severe winters nor the hot summers. The moderate climate enables us to secure hatchable eggs early in the season — a fact which results in Massachusetts leading the market in all kinds of poultry products.

The soil in this state is almost ideal for poultry keeping. A light, sandy or gravelly loam is much better than the soils found in the middle west or in the southern part of our country. Rains can easily cleanse light, sandy soils and keep them in good condition for poultry year after year, providing we do our part in the way of cultivation. Moreover, land in Massachusetts is fairly cheap, and this enables one to start a poultry farm with very little capital.

Again, the fact that meat is gradually increasing in price and becoming scarce, and the fact that egg consumption is on the increase means that for years to come poultry and eggs will demand a high price and should yield a good profit to one who understands poultry keeping.

There is another advantage that the poultrymen of this section have over those in other parts of the country: the people of Massachusetts demand poultry and eggs of excellent quality, which means that over-production in certain parts of the country does not affect the prices of home products.

For those who wish to manage poultry farms for other people, or become instructors in agricultural colleges and schools, or investigators at experiment stations, the opportunities are practically unlimited.

During the past few years the Massachusetts Agricultural College has given particular attention to the development of its department of poultry husbandry. It now has one of the best departments in the country, offering a broad training in the practice as well as in the theory of poultry husbandry. Instruction is given in practically every phase of the industry, including hatching, brooding, feeding, general management, judging, and marketing poultry and poultry products.



Poultry Plant



French Hall—Floriculture, Forestry, and Market Gardening

Floriculture

Massachusetts agriculture is characterized by intensive specialties. One of the most typical of these is the growing and selling of ornamental plants and cut flowers. This work is carried on largely under glass, but with every extensive greenhouse planting there is more or less work in the open ground. The cultivation of ornamental plants in gardens also has considerable importance throughout New England and the professional gardeners are expected to have a knowledge of this branch also.

In all these various lines there are openings for many men, and as the work requires great skill, trained men are obviously more valuable than untrained men. In no line of work is the combination of scientific education and practical skill more important. In other words, the successful man needs not only practical experience, but also the most thorough education he can possibly receive.

It is fair to say that the greatest profits in eastern agriculture are to be found in the most intensive specialties and that, for the amount of land used and money invested, floriculture is one of the

best. While the largest opportunities are open to men who engage in this line of work for themselves, there are also many chances for young men to hire out to others already established in business. As the production and selling of flowers and the care of gardens requires a great amount of labor, these opportunities to work for wages must necessarily be very numerous.

The Massachusetts Agricultural College is equipped to supply the training in the science of floriculture. Its extensive system of greenhouses offers ample opportunity for the observation of proper methods of greenhouse management and construction. For several years the department has been developed by one of the leading teachers of floriculture in this country. A careful study is made of the methods of raising the various greenhouse plants; this includes propagation, transplanting, fertilizing, fumigating, spraying, and watering. Instruction is also given, and practice required, in gathering, storing, and marketing flowers.

Forestry¹

The field of activity for properly trained foresters is so broad and varied that no one can hope to become an expert in every branch of this subject. It is expedient therefore for the student to specialize in one or more phases as soon as he determines which branch he prefers, or rather, for which branch he is best fitted. The various specialties in which forestry students have successfully engaged include logging engineering, milling engineering, timber cruising and estimating, consulting forestry, Federal and state government forestry, commercial forest tree nurseries, and city forestry.

Logging engineering comprises the business of harvesting the forests. It includes the falling of trees and cutting them into proper log lengths; hauling the logs to local centers — that is, either to the mill or to the logging railroad and there loading them on cars. This work requires sufficient civil engineering skill to survey and map extensive areas of forest land, to locate and build logging railroads, wagon roads, bridges, and dams. It also requires sufficient mechanical skill to superintend the installation and operation of upright and horizontal stationary and portable steam engines.

¹ For a more exhaustive discussion of the possibilities of this profession the prospective student is referred to Forest Service Circular 207, entitled "The Profession of Forestry" by United States Chief Forester, Henry S. Graves. This may be had free upon application to the United States Forest Service, Washington, D. C.

Milling engineering is the business of sawing the logs into lumber and either storing the lumber in yards or loading it on cars for shipment to market. It requires sufficient skill to install and operate the usual saw mill machinery.

Lumber estimating and cruising comprises the business of locating merchantable forests, estimating the quantity of timber they contain, and judging the quality of the timber. It necessitates extensive trips into forest regions not easily accessible and is apt to call for unusual physical endurance.

Consulting forestry consists in advising about, making plans for, administering, and executing forestry work of all kinds for private owners of timbered lands. Before success can be assured considerable previous experience is necessary and the degree of success depends largely on the extent of the reputation of the consulting forester.

State and government forestry represents a very broad field, embracing the entire United States inclusive of Alaska and the island possessions. This may be largely field work or it may be almost entirely office work; it may require a high degree of technical skill along special lines or it may call for general executive ability.

Commercial forest tree nursery work comprises the business of growing forest trees in large quantities in nurseries to be sold to any one who wishes to buy them. Frequently it includes also the rendering of services in connection with the actual planting of the trees sold.

City forestry is the business of setting out and caring for city trees and woodlands. This vocation also includes the preparation of extensive plans for city beautification and the management and care of city parks and public gardens.

The Massachusetts Agricultural College is not prepared to give its students an exhaustive training in forestry. It does, however, give sufficient instruction to afford a general insight into the profession, and prepares men to manage intelligently the less difficult problems. Moreover, for those intending to specialize in forestry at some of the schools for advanced study, this institution offers an admirable basic training through courses in its departments of botany, entomology, floriculture, forestry, landscape gardening, and chemistry.

Landscape Gardening

Private and public gardens are being established very rapidly throughout the United States. Practically every city now has extensive public parks, and large parks are also being established by various states, counties, and even by small towns. Such parks must be designed by highly trained men and the construction must also be carried out by men of special skill and experience. When it is considered that there are literally thousands of these public parks and hundreds of thousands of private estates to be designed, constructed and maintained, it will be seen that there are opportunities for employment for a good many properly trained men.

Young men just out of college usually find employment in park construction or maintenance, or in construction work carried on by active landscape gardeners. A few of them are employed in the work of designing and drafting. Eventually, as they acquire experience, men who are adapted to the profession are enabled to set up in business for themselves. In this way the field is open for reasonable progress to men who have the ability, the courage, and the industry to keep themselves at the front.

At the Massachusetts Agricultural College the plan of instruction embodies the careful study of the scientific principles underlying the art of landscape gardening, the study of numerous planting designs by the most noted landscape architects of the country, drawing, field work in surveying and mapping, the preparation of planting plans for specific parks, gardens or estates, and a study of trees, shrubs, and other plants used in ornamental gardening.



Wilder Hall—Landscape Gardening and Pomology

Market Gardening

The distinctive character of modern agriculture is specialization. General farming still has its merits, but the intensive cultivation of special crops is apt to be more profitable. In New England, in particular, this principle of specialization is being applied with conspicuous success. And amongst all the lines of intensive agriculture market gardening takes a very high place — perhaps indeed the first place. The market gardeners are everywhere taking the lead in adopting the most advanced methods of cultivation, irrigation, fertilization, and marketing. In many districts they are resorting to the use of greenhouses for the production of winter and spring vegetables. In fact all the popular vegetables are now produced under glass in our climate, not in small quantities, but by hundreds of tons annually.

Market gardening, whether conducted out of doors or under glass, has two of the qualities belonging to intensive agriculture everywhere: (1) it requires the highest skill and the best training, and (2) it is capable of yielding the highest returns. The market gardener almost more than any other tiller of the soil can afford to invest in the most expensive land and the costliest farm fixtures. Equally he can

afford to invest in the very best training for his calling. The men who have the widest knowledge of the principles of modern scientific agriculture as taught in the agricultural colleges coupled with the best practical experience are the ones who are sure to win the largest success.

Opportunities for market gardening in Massachusetts are practically unlimited. This section does not produce more than a small fraction of the vegetables consumed, and probably never will. There are thousands of acres of excellent garden soil selling at relatively low figures and yet conveniently near unexcelled markets.

Besides these splendid openings for practical enterprise in market gardening there is a strong demand for competent men to fill salaried positions in teaching, experimental work, and the like. The pay is good in these positions, and this field appeals to some who do not find it possible to go into business for themselves.

The Massachusetts Agricultural College is a potent factor in preparing young men for successful careers in market gardening; a portion of its estate is devoted to the production of market gardening crops. By courses of instruction offered in the departments of agronomy, botany, and entomology, as well as market gardening, the student has superior advantages in familiarizing himself with the sciences which affect most closely the market gardening industry.



Practice in Market Gardening

Pomology

There are four general departments of work which present themselves to young men who are proficient in the science and practice of pomology.

First and best, there are excellent opportunities to engage in fruit growing. For the right man in the right place there is perhaps no branch of farming that promises better returns. Where a young man has the necessary capital this is the line of work above all others in pomology that the department would like to see its graduates elect. There is talk in certain quarters of over-production, but the day is certainly far distant when first class fruit will not command a good price.

Second, there are always a number of positions for young men of training and experience as managers of fruit farms. It must not be expected that a young man without any practical experience can fill such a position, but the man who knows not only the scientific principles but also the practical details of orchard work, and who is capable of handling men and producing results, can, almost without exception, find profitable employment in such work. For our New England conditions it will usually increase his chances of success if he is proficient in other agricultural activities as well as in orcharding; for example, if he can manage a dairy or poultry plant, as well as an orchard, he is doubly sure of a position because the majority of our New England farms and estates are not devoted entirely to one line, but combine two or more agricultural specialties.

Third, there is always a call for teachers in pomology, both in colleges and in secondary schools. For several years there have been more of these teaching positions than the department has had qualified men to recommend, and at the rate at which courses in agriculture and horticulture are being introduced into schools this demand will certainly increase. Closely allied with this work is that of "extension teacher in pomology" and here again the demand is even now ahead of the supply of qualified men and is sure to increase markedly in the next few years.

Lastly, there is a limited demand for men to do research work in pomology. There are usually fewer men in each class who are quali-



Students Setting Out Strawberry Plants

fied by natural aptitude and training for this work than for the others mentioned, but when a young man *is* qualified he can usually secure an excellent position.

These are the principal forms of pomological work in which there is a call for men. What remuneration the young man receives for his services depends entirely on the man himself. There is never any dearth of paying positions for the man who has executive ability, who has some practical experience, and above all who is willing to work. In fact the pomological market is like every other market: there is never enough of the best.

The department of pomology is one of the most popular at the Massachusetts Agricultural College. The classroom instruction is supplemented by practical work in spraying and pruning, also in grading, packing, and judging fruit; extensive orchards at the college and in its vicinity, and a fruit packing and storage building furnish excellent laboratories for students specializing in pomology. Every year a large number of men graduate from the institution, efficiently trained and in some cases thoroughly prepared to successfully pursue a vocation along some of the lines here described.



Clark Hall—Botany

Botany and Plant Pathology

The department of botany at the Massachusetts Agricultural College is remarkably well equipped to give the student a thorough training in botany with especial emphasis on plant pathology and physiology. The building devoted to this work is provided with two large, well lighted laboratories, and a number of special rooms for graduate work. Annexed to the building is a greenhouse which is used entirely for experiment purposes and contains several aquaria for growing aquatic plants.

The botanical courses during the first two years are designed primarily to give fundamental training in the science. The junior and senior courses are elective. Such subjects as plant anatomy, histology, ecology, physiology, and pathology are covered in a very practical way and not only afford a fundamental training but are well adapted for those intending to specialize in general agriculture, entomology, or chemistry. Some of them might be called "information courses;" that is, they are designed to supply knowledge of a practical nature to the students electing practical courses.

The vocational subjects taught in this department include, among others, the course in plant pathology which is devoted entirely to the study of the diseases of economic plants, and is of sufficiently wide scope to afford a thorough foundation in the subject and to fit the student for experiment station work, for which trained men are always in demand. There is usually sufficient time for work on some original problem for those electing senior courses in this subject. Another vocational subject is plant physiology, which is coördinated with chemistry and furnishes training for experiment station work or teaching.

A course entitled "shade tree management" is also given. This embraces a thorough study of all the factors affecting shade trees whether produced by fungi or other causes, and a study of the structure and function of the tree. It is particularly planned for those intending to practice tree surgery, spraying and pruning, and affords a thorough and technical knowledge of the subject.

Particular attention is also given to the various diseases infecting all agricultural crops grown in Massachusetts; a careful study is made of the characteristics, method of infection, and manner of control of diseases of fruit, vegetables, grain, greenhouse plants, and shade trees.

The chief vocations in botany are found in teaching, investigational work, and in expert service in municipal, state or government employ. There is constant though not excessive demand for well trained men to fill attractive positions of the types indicated.

General and Agricultural Chemistry

The courses in chemistry at the Massachusetts Agricultural College are arranged for a twofold purpose:

They are intended to give to every student entering the college a good understanding of the elementary principles of the subject such as an educated person should possess. Every college man should know, and the college intends to teach, the chemistry of the common things of life — such as the air breathed, the food eaten, the water drunk, and the clothes worn. The college man should have, further, a general understanding of the chemistry of digestion and the relation of chemistry to sanitation. It is also important for him, as a practical man of the world whatever his occupation, to know something about the chemistry of iron, steel, oils, paints, and cements. If he is to follow agriculture as a vocation, he should know the general composition and reactions of soils, fertilizers, insecticides, and fungicides. Of equal importance is a good understanding of the chemistry of plant and animal life, together with the composition and nutritive value of such agricultural products as cattle feeds, maple sugar and

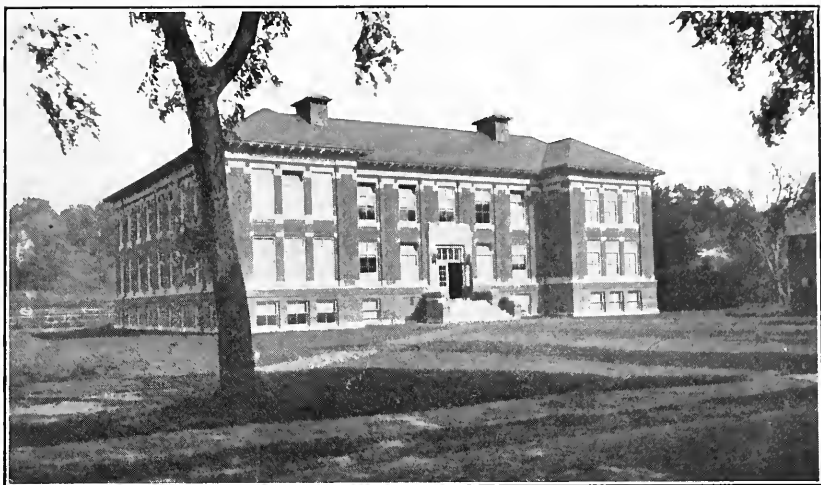


Chemistry Laboratory

maple syrup, milk, butter, cheese, alcohol, paper, wood pulp, and the like. Several courses are intended to give the student instruction which, without being too technical in character, will enable him to understand chemical principles, and to apply them to the ordinary life processes and to the agricultural industries.

Courses are also planned for students who may desire to specialize in chemistry. The object of the strictly chemical course is to give men a thorough training so that they can take advanced work in any department of the science. The course is also intended to fit men for teachers in high schools; for assistants in college chemical laboratories; for analysts in fertilizer, cattle food, and sugar factories; for assistant chemists in municipal and experiment station control laboratories; and for assistants in the research laboratories of the experiment stations.

There is a reasonably good demand for men who are willing to devote a few years to advanced study along these lines, and who can prove their worth as faithful workers and careful investigators. The department cannot promise positions to any of its students. It does make an effort to secure places for all men whom it regards as well trained and worthy. It refuses to recommend any man who does not measure up to its requirements.



Laboratory for Entomology

Entomology

The close and important relation of insects to the raising of crops demands some knowledge of the subject for workers in nearly every department of agriculture. The field of entomology is very extensive, about five-sixths of all living things being insects. Anything like a complete knowledge of insects, therefore, can be obtained only by the specialist. The assistance of trained entomologists is constantly needed in solving the problems of protection from and the control of insect pests. Men trained in such work obtain positions in experiment stations, as state entomologists and in the entomological work of the United States government, and also as teachers of the subject in colleges and other educational institutions. The education of men teaching agriculture in high schools, which is a rapidly broadening vocation, should include a good knowledge of insect pests and their control. In all the lines named the demand for well trained men has thus far exceeded the supply.

Work in these places (except teaching) consists largely in the investigation of the life histories and methods of control of those pests

of which this knowledge has not been as yet obtained; the answering of letters and questions which come in large numbers from farmers, and others suffering from the ravages of insects; the establishment of parasitic enemies of the pests; the accumulation of reference collections of the different stages of the various pests; and the experimental testing of various methods of control.

The entomologist then, might be described as an agricultural specialist who gives his attention to clearing up the difficulties in insect lines, met with by the actual crop producers, and to the discovery of ways in which loss by insects may be reduced or avoided.

For all these vocations, the Massachusetts Agricultural College offers as good a training as may be secured anywhere in the United States. One of the largest and best equipped entomological laboratories in the country is devoted to the department. Here are studied from specimens the characteristic forms of the various types of insects. Work is required in collecting and classifying insects. To this institution perhaps more than to any other in the United States do calls constantly come for men thoroughly trained in entomology, to undertake the solution of the difficult and serious problems connected with this science.

Microbiology

Those living forms which are beyond the range of the human eye include within their sphere of activities many of the important phenomena or realities of nature and life. They are in the air we breathe, the water we drink, the food we eat and the soil we tread. They cause many of the changes which we seek and many which we antagonize; they work for and against man. The province of microbiology is to foster these organisms in their operations favorable to man, and to hinder or prevent them in those which produce injury to man.

This work calls for men to expend their energies in several directions. There must be specialists in microbiology who will concern themselves with dairy operations, beginning with milk production and following the milk through to the consumer as milk, butter, cheese, or other milk products. Specialists are needed to devote their efforts to soil microbiology, for in this branch of science are found most of the changes occurring in the soil; these changes must be known and be made the subjects of control.

Food supervision becomes of greater importance each advancing day; through its preservation and decomposition in the processes of drying, canning, brining, and refrigerating, a wide range of possibilities arises and trained men are needed. Sanitary studies are largely based upon microbiology; through these channels the life of the nation is to be protected, and here is an opportunity to serve effectively. In veterinary and medical work perhaps no science is receiving more attention than microbiology, for in it are found the causes of many diseases as well as their cure.

Whether the microbiologist acts in the field of instruction, of research, or of control, experience has found it to be a small niche which an individual man can fill with credit to himself and the world. He should be familiar with the whole subject of microbiology and its correlated branches and with the essence of his specialty to such an extent as to express wisdom and effectiveness.

The following of agricultural practices calls for at least a working acquaintance with micro-organisms. The nature of the soil and its cultivation, the biological significance of drainage and fertilization, the value of leguminous and other crops, the management of the dairy, the dangers from infectious or contagious diseases among animals and in the home, the sanitary features of the home and stables, the care of food, and many other features involve a knowledge of micro-organisms which should be more than passing.

Men attracted by work of this character will find extensive courses offered at their state agricultural college.



Veterinary Laboratory

Veterinary Science

The business of the man trained in veterinary science is one of the firmly established agricultural professions and is one which will always offer attractive opportunities to the person adapted to this character of work, and who thoroughly prepares himself for the profession.

The demand for well qualified veterinarians was never as great as at the present time. One reason for this is the increase in value of farm animals, which amounts in many cases to a doubling of the value of ten years ago. When values were much lower than they are today the services of the veterinarian could be dispensed with, in case of sickness, without entailing serious loss to the stock owner, but with present values his services are indispensable. There are many localities where a veterinarian can build up a lucrative private practice; this is possible in stock raising sections that a few years ago would not have supported a practitioner, owing largely to the fact that sera and vaccines which are used extensively in the prevention of disease can be administered only by the registered veterinarian.

In the United States Army two veterinarians for each regiment of cavalry are required. The United States Department of Agriculture employs each year an increasing number of veterinarians; they serve as executive officers, investigators of animal diseases, meat inspectors, live stock agents, and quarantine officers. In nearly all states veterinarians are appointed to execute the laws relative to quarantine against contagious diseases from without their borders and the control and eradication of them within. The many state agricultural colleges and experiment stations employ one or more veterinarians for teaching and investigational work relative to animal diseases. In numerous cities and towns veterinarians are employed by boards of health as inspectors of meat, milk, dairies, and slaughter houses.

For these various state and government positions, as well as for private work, the demand is for the man best qualified by study and practice to deal with the special branch of the service to which he is assigned. There is little opportunity in this profession for the man with only an ordinary training.

The courses in veterinary science included in the curriculum of the Massachusetts Agricultural College do not lead to a special veterinary degree. Neither do they fully qualify one to engage in any line of veterinary practice. In the main the veterinary instruction is supplemental to the courses in general agricultural science, although it is intended to be so broad in its scope as to meet the requirements of the practical stockman and the prospective student of veterinary or human medicine. It is the aim of the veterinary department to guide the student to a sufficient general knowledge of animal disease that he may give stock such care and treatment that diseases may be prevented whenever possible, and in case of emergency to render first aid treatment to those that are attacked by disease.

In view of the opportunities offered by the agricultural colleges for obtaining a knowledge of the subjects so closely correlated with the essential ones of the special veterinary college, it is advisable whenever time and means permit that the prospective student of veterinary medicine should pursue a full four-year course in an agricultural school before entering upon the work of the strictly veterinary curriculum. It is time and money well spent to thoroughly fit one's self for a life work.

Beekeeping

It has been said that "beekeeping is the oldest art under the sun." True, but the business of beekeeping is young. It is, moreover, becoming much diversified and sub-divided into narrow specialties. There is the honey producer; the bee-rearer or producer, whose sole aim throughout the season may be to "make" more bees; there is the professional queen-rearer, whose business it is to rear and mate queen-bees for market; in some localities there is a tendency toward specialization in wax production from a commercial standpoint; finally there are the specialists who have become expert in handling the products of beekeepers; in some of these establishments many tons of honey are daily graded, bottled and shipped to market. Massachusetts has her increasing share in all of these industries.

With the growing recognition of the young industry, comes the demand from all parts of the country and even abroad for those who can teach and investigate or organize and develop the industry. In many states beekeepers are requiring of their beekeeping specialists field service in the suppression of brood-diseases of bees. Already the country is looking to Massachusetts, as a pioneer in this field, for men and assistance.

The beekeeping industry is already extensive, representing an income to the country of millions of dollars; but beekeeping has an even greater, more important, and fundamental agricultural aspect than any yet enumerated. It is that inestimable service of the honey bee in seed, vegetable, and fruit production. It is this horticultural relationship of beekeeping which is of deepest significance to Massachusetts as well as to the country, in fact wherever peaches, plums, cherries, pears, apples, various berries, certain seeds and vegetables are grown. Even though horticulturists till, fertilize, prune, and spray, it has been proven that their harvest may fail unless the bees are sufficient to pollinate the flowers. So particularly dependent are certain horticultural specialists, that at least two thousand to twenty-five hundred colonies of bees are annually utilized in the cucumber greenhouses of Massachusetts alone. Within the last few years Massachusetts cranberry growers have found that honey-bees assure greater success in their million dollar enterprise. Similarly field-crop growers, as of melons and cucumbers, are introducing bees on their

plantations. Likewise the commercial orchardists, small-fruit growers, and the professional seed producers realize that it is most profitable to maintain apiaries.

Instruction in beekeeping at the Massachusetts Agricultural College has primarily one aim: that of preparing the student to go forth equipped with a fundamental knowledge of the industry. But it should be borne in mind that preparation for research and investigational work requires a broad training in various other sciences, as well as in the art of beekeeping.

In order to meet the various requirements of those attending the institution, several courses are offered. For this work the instructional equipment includes an exceptional collection of apicultural and scientific literature; a museum, which doubtless contains the largest collection of products and natural history specimens, apicultural implements, machinery and materials to be found in the world; an apiary of about two acres in which is a "bee garden" with a collection of nectar-yielding plants; fifty colonies of bees of important races and types; and the "bee-house," a compact, convenient and modern apicultural laboratory, with a well equipped work-shop, wax-rendering plant, honey-room, and bee-cellar for wintering.



Bee House

Agricultural Education

The number of opportunities are increasing rapidly for persons prepared to teach agriculture in secondary schools. Eight or ten years ago there was no appreciable demand for teachers of agriculture outside of the agricultural colleges. Today the high schools of the country are asking for more teachers of agriculture than they can obtain. In 1913 the Massachusetts Agricultural College received requests for nearly forty men to teach agriculture. The demand is always for well qualified men; the requirements named are experience in practical farm life, a study of scientific and technical agriculture, and a study of the principles and methods of teaching the subject as well as some experience in teaching. It is difficult to find men having all of these qualifications; for this reason the wages are better than for those prepared to teach in departments that are overcrowded with experts.

In addition to the routine work of teaching, the widespread and growing interest in boys' and girls' agricultural clubs, and in school gardens, is demanding both men and women to direct this work. A number of cities are promoting home and school gardens. They are seeking as directors of this work men who have both practical and professional training. This movement in garden work seems destined to result in a large amount of summer work for those who are prepared to direct it. A feature that should appeal to teachers who wish a pleasant and profitable vocation is that the work takes them out in the open.

The college offers opportunities for scientific and technical studies as well as professional study in the principles and methods of teaching. Plans are under consideration for giving candidates some practice in teaching as a part of their preparation.



School Gardens—M. A. C. Grounds

Rural Leadership

The need of training rural leaders along business and social lines has been voiced by many thinkers. The Massachusetts Agricultural College is probably the first institution in the United States that has attempted to meet this need by developing departments of agricultural economics and rural sociology. These departments offer a series of courses that are intended to fit students for important vocational positions in rural social service.

Excellent opportunities are offered by agricultural colleges, state boards of agriculture, and the United States Department of Agriculture, especially in its new Bureau of Rural Organization, for college men trained in the economics and sociology of rural life. The demand for men to enter these inviting fields is much greater than the supply.

The widespread interest in agricultural credit, business coöperation among farmers, and generally a greater efficiency in the marketing of farm products is also calling for leadership in these activities. Not a few farmers with broad minds as well as broad acres are asking for a new type of social secretary to look after the welfare of their workers and the development of community interests. Also in connection with the recreational, sanitary, and religious interests of country communities is there an increasing call for men who have

expert knowledge of the psychology, conditions, and tendencies of rural life, together with a real love for country people. This call comes especially from leaders in the churches, the county Y. M. C. A., boards of health, and philanthropic organizations. Professor Fiske, of Oberlin, says, "Both the need and the worthiness of rural life, its social and religious crisis, and its strategic signs of promise, bring the challenge of the country to the man in college."

There is a growing consciousness everywhere that country life, which has so long been neglected in its economic and social aspects, should at last receive the recognition that it deserves. With this consciousness, we may expect a broader field for rural leadership and a growing appreciation of its service.

Perhaps the finest opportunity which presents itself to a graduate from an agricultural college, is that of establishing himself in a rural community and, if he possess the necessary qualities, becoming a leader not only in his own vocation, but also in various matters of general community interest. Thus, if he be a farmer, he may through his own economic success do much to better the farming conditions of his associates and he may at the same time exercise large influence in the social, recreational, and educational life of his town. Or, if he chooses the profession of teaching, medicine, or the ministry, he has a similar opportunity to make his personality and leadership felt in the large problems confronting the community.

Graduate Work in Agriculture

When agricultural colleges were first organized and experiment stations established, the character of the work was largely the extension to the new field of agriculture of such knowledge as was already available. Instruction assumed more the rôle of secondary education than college training. Research was merely confirmation and testing. Out of this incipient stage, agricultural education has been advancing to that of the highest professional plane, and research to that which

is needed for the solution of the most intricate subjects in agriculture. Here is a field for agriculturists, agronomists, animal husbandrymen, beekeepers, botanists, chemists, dairymen, economists, entomologists, floriculturists, landscape gardeners, microbiologists, physiologists, pomologists, sociologists, vegetable gardeners, teachers, and others.

This condition of intensity has reached beyond institutional walls and penetrated the domain of industries and actual agricultural practices. Park commissions are using landscape gardeners; estates employ farm managers; beet-sugar plants employ trained agriculturists and chemists; milk plants require dairymen and bacteriologists; canneries use bacteriologists and gardeners; fruitmen employ men who are plant physiologists or plant physicians; implement manufacturers prefer men with agricultural experience; states must have their entomologists, foresters, botanists, chemists, bacteriologists; and so on indefinitely into the many phases of commercial and industrial life closely allied to agriculture.

Another feature is developing in the actual managing and conducting of farms. It is being realized that there are so many complicated processes of nature involved in farming, and so much demanded in capacity, that intensive training and peculiar experience are wanted. Progress does not consist in passing on from generation to generation traditional and empirical methods but in the introducing of known facts or established knowledge into the constant remodeling of the daily duties of farm life. Only a man who possesses such knowledge (devoid of traditional prejudice), capacity, ingenuity, initiative, and a thorough knowledge of practice as recognized at the present, can be expected to throw off the shackles of age and produce a modern and scientific agriculture.

Because of these circumstances, (as has been found in every other profession so in agriculture) there must in some cases be a more extended training and an accumulation of varied experience before a young man can pass out into life and be successful.

The Massachusetts Agricultural College is prepared, through its graduate school, to train specialists in many of the branches to which reference is here made.

Agricultural Experiment Station Work

The number of men highly qualified for experiment station work is not equal to the demand, and if a young man has reason to believe that he has ability in that direction there is every reason why he should plan to follow this as a vocation. Every young man, however, in fixing upon his life work will wish to consider its opportunities. The principal factors which are likely to influence him are:

1. The certainty of employment.
2. The financial prospects.
3. His natural fitness for the occupation.
4. The opportunities which it will afford for service.
5. The time and cost required to make the necessary preparation.

1. The Certainty of Employment

There is a large and constantly broadening field of investigation open to the experiment stations — a field which will certainly afford employment for all young men with natural talent and ability in investigation; and, since the proportion of individuals gifted by nature and fitted by training for this kind of work must always be relatively small, there appears not the slightest prospect that the ranks of thoroughly qualified station workers will become overcrowded.

2. Financial Opportunities

In the direction of prospective salary, experiment station work will not satisfy the ambitions of men who attach great importance to the possession of wealth. The salaries commanded even by the best of experiment station investigators are moderate or even small as compared with those commanded by men of no greater ability engaged in many lines of business or professional work. The young man, therefore, who wishes to be rich above everything else will not engage in station work. On the other hand the salaries are sufficient to satisfy all reasonable needs and the probability is that with the increasing recognition of the value of investigational work in agriculture, the salaries of the future will be relatively more generous than those of today.



One of the Experiment Station Buildings.

3. *The Interest of the Work*

Who does not know the intense interest connected with discovery? There can be nothing more fascinating than the search for and discovery of facts, principles, and laws which are additions to the sum of human knowledge. It is true that the discovery of new principles and laws is not easy and it is also true that it often requires a large amount of routine work which to the outsider may seem like drudgery. No such work, however, can be drudgery to the true investigator for he will always recognize the essential nature of such work and is ever looking forward with hope to the time when he shall establish a principle or a law which no one has ever known before.

4. *Opportunities for Service*

No one who is familiar with the present state of knowledge of the scientific principles which underlie farm practice can doubt the breadth of the field for further discovery. The number of unsolved problems is far greater than the number of those that have been solved. We already know enough to feel certain that this is the case, but as our knowledge increases the breadth of our view increases also, and the investigator of future years will delve in fields which now are not even dreamed of. Whatever adds to the sum of human knowl-

edge is of service or will be of service sooner or later to the human race. No one can measure the value of the discovery of Hellreigel and Welfarth that bacteria living in symbiotic relationship with legumes in the nodules on their roots give these plants the capacity to make use of free atmospheric nitrogen. There can be no question, however, that this single discovery is worth more to the agriculture of the world than all that has ever been spent on agricultural investigation the world over. Every right-minded young man is fired with an ambition to serve the human race. There is no field in which this ambition is more likely to be gratified than in the highest type of experiment station work.

5. The Amount of Preparation Required

This consideration should not be given undue weight. If a man has ability and talent as an investigator nothing should prevent his devoting himself to that work, and where the talent and the desire to engage in such work exist, a way to meet the requirements can undoubtedly be found. The time has gone by when a man desiring to engage in such work should be satisfied with an inferior preparation. No one can expect to make satisfactory progress as an investigator who does not first take a thorough four years' college course, and who does not in addition take a post graduate course in which he carries out a piece of thorough scientific work as a preliminary to obtaining an advanced degree. In many cases it will be preferable, after having completed the four years' college course, to engage for a year or two in station work. This is desirable for two reasons: first, it will give the young man an insight into the nature of such work and he will be in a position to make up his mind more surely as to whether it is attractive to him; and second, he will gain a most valuable insight into the nature of the preparation for the work required and will therefore take up his graduate work with a broader vision and increased determination to do the work in the most thorough manner possible.

Agricultural Extension Service

The field in agriculture which is perhaps offering the most attractive opportunities to young men and women interested in this subject is that of extension work. For the first thirty-five or forty years after the passage by Congress in 1862 of the Morrill land grant act establishing the agricultural colleges, these institutions devoted their time chiefly to teaching college students and carrying on research and experimental work. These two lines are still being developed with even more vigor and thoroughness, but in the last decade a third line of work, that of carrying out to the people the teachings of the college and the results of the research work of the experiment station, has come rapidly to the front. The intense interest in and rapid growth of extension work in this country is due to changed economic conditions, and to a realization on the part of all the people — city and country dwellers alike — that the great problem in agricultural education today is to carry to the people on the farms the vast fund of knowledge possessed by our colleges and experiment stations.

Extension service is neither advertising a college nor carrying on popular forms of propaganda work. It is a sane, dignified, and systematic attempt to teach to the people of a state the latest known facts in agricultural science and to demonstrate to them the best methods of farm practice.

During the last six years more than forty of our agricultural colleges and state universities have established departments of extension work. Legislation is pending in most of the remaining states, and proposed Federal legislation giving support for this work to the several states will enable those already engaged in this service to enlarge it in a considerable degree. Extension service in this country is hardly even in its infancy and development will no doubt be rapid during the next few years.

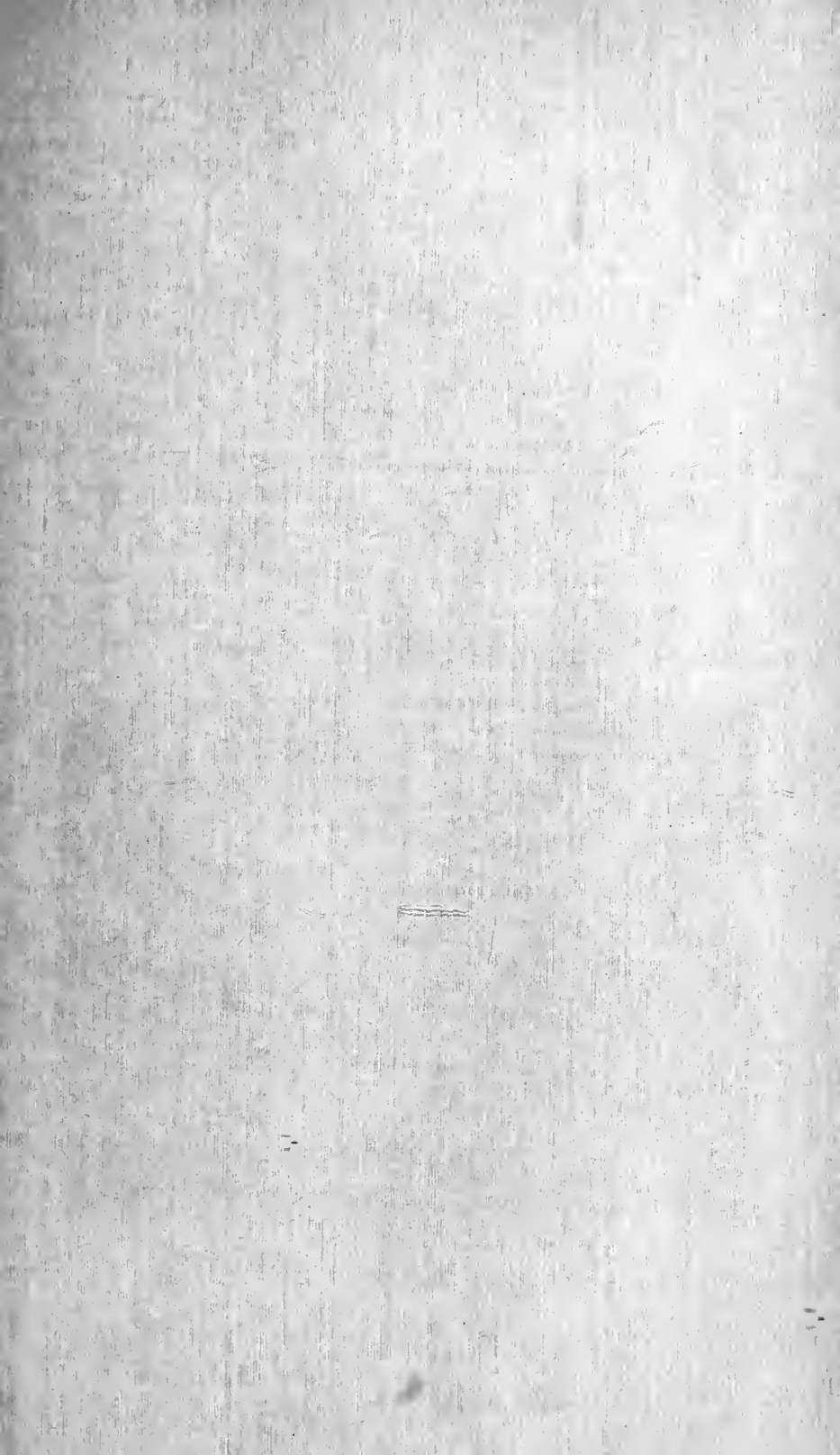
The field of extension work is as broad as agriculture and the sciences related to it. Men and women will be needed as general administrators and organizers of the work. Specialists are being called for in large numbers to render service in dairying, animal husbandry, poultry husbandry, farm management, soils and crops, fruit growing, boys' and girls' agricultural clubs, home economics, rural sanitation,

agricultural engineering, agricultural surveys, teachers of agriculture in high schools who can also advise with farmers, county agricultural advisers and demonstrators, community service work, farmers' co-operative organizations, and rural credit.

In training themselves for work in the extension field, young men and women should secure a thorough education in English and public speaking, the sciences, especially chemistry, geology, entomology, botany, and physics. Technical work in soils, crops, animal husbandry, dairying, poultry, fruit growing and other horticultural subjects, economics, and sociology, are absolutely fundamental. The practical side of farming, the conditions in and needs of our rural life, must be learned either prior to entering college or after graduation before one can hope for much success in extension service.

To such as possess the proper qualifications and are willing to acquire the necessary technical training and practical experience, extension work offers at the present time, so far as financial remuneration and opportunity for service are concerned, a field of labor than which there is no other of greater importance among the agricultural vocations.





Massachusetts Agricultural College

THE EXTENSION SERVICE

SUMMER SCHOOLS

1914



AMHERST, MASS.

"THE AMHERST MOVEMENT"



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1914

The Summer School of Agriculture and Country Life

June 30—July 28

School for Rural Social Service

July 15—July 28

Boys' Agricultural Camps

First Camp	.	.	.	.	June 30—July 8
Second Camp	.	.	.	.	July 10—July 18
Third Camp	.	.	.	.	July 20—July 28

The Poultry Convention

July 22—24 Inclusive

Conference on Rural Community Planning

July 28—August 1 Inclusive

CALENDAR 1914 SUMMER SCHOOL

June 29—Registration for Summer School of Agriculture and Country Life.

Tuesday, June 30—Classes begin.

First Boys' Agricultural Camp opens.
Evening, informal reception.

July 1—Afternoon Excursion—The Orient.

July 2—7:30 p. m. Lecture—"New England, God's Country,"

Rev. A. L. Squier, Cambridge, Mass.

July 3—8-11 p. m. Social evening.

July 4—Community Fourth of July Celebration.

July 6—Afternoon class excursions and recreation.

July 7—8-10 p. m. Social evening.

Wednesday, July 8—First Boys' Agricultural Camp closes.
Afternoon Excursion—Sugar Loaf Mountain.

July 9—7:30 p. m. Moving Pictures of Agriculture and Country Life.

July 10—Second Boys' Agricultural Camp opens.
8-11 p. m. Social evening.

July 11—All day excursion—Old Deerfield.

July 13—Class excursion and recreation.

July 14—Classes for first two weeks end.

Registration for School of Rural Social Service.

8-10 p. m. Social evening.

Wednesday, July 15—Classes for second two weeks begin.
Afternoon Excursion—The Notch, Bear Mountain, The Holyoke Range.

July 16—7:30 p. m. Evening Lecture. "Nature's Feathered Foresters."

July 17—8-11 p. m. Social evening.

July 18—Second Boys' Agricultural Camp closes.

All day excursion—Mount Holyoke College, The Paper Mills, Mount Tom.

July 20—Afternoon class excursion and recreation.
Third Boys' Agricultural Camp opens.

July 21—8-10 p. m. Social evening.

Wednesday July 22—Poultry Convention opens.
Afternoon Excursion—Mount Toby.

- July 23—7.30. Evening lecture.
Dr. John Graham Brooks, Cambridge, Mass.
- July 24—Poultry Convention closes.
8-11 p. m. Social evening.
- July 25—All day excursion—Smith College, Williamsburg, Petticoat Hill.
- July 27—Class excursion and recreation.
- Tuesday, July 28—12 m. Summer School of Agriculture and Country Life ends.
School for Rural Social Service closes.
Third Boys' Agricultural Camp ends.
2 p. m. Conference Rural Community Planning begins.
For details, see separate program.
- July 29—Conference Rural Community Planning.
See separate program.
- July 30—Conference Rural Community Planning.
See separate program.
- July 31—Conference Rural Community Planning.
See separate program.
- Aug. 1—Annual Field Day in co-operation with the Massachusetts State Grange.
Subject—"The Place of the Grange in Rural Development."
Eminent speakers will participate.
Conference ends.

FACULTY OF THE SUMMER SCHOOLS

- Kenyon L. Butterfield, LL. D. President of the College.
- William D. Hurd, M. Agr. Director of the Extension Service.
- Herbert J. Baker, B. Sc. Field Agent in Farm Management.
- John L. Byard. Superintendent of the Apiary.
- John R. Boardman, New York City. Lecturer on Rural Leadership.
- Jennie Buell, Ann Arbor, Mich. Lecturer Michigan State Grange.
- Alexander E. Cance, Ph. D. Associate Professor of Agricultural Economics.
- Joseph S. Chamberlain, Ph. D. Professor of Organic and Agricultural Chemistry.
- William D. Clark, M. F. Professor of Forestry.
- Laura Comstock. Extension Professor of Home Economics.

- Samuel Coons. Buttermaker.
- Philip H. Elwood, Jr., B. Sc. Agr. Extension Instructor in Civic Improvement.
- Elmer K. Eyerly, A. M. Associate Professor of Rural Sociology.
- R. Hay Ferguson. Extension Professor of Agricultural Economics.
- Henry T. Fernald, Ph. D. Professor of Entomology, Chairman of Division of Science.
- G. Walter Fiske, LL. D., Oberlin, Ohio. Dean Oberlin Theological Seminary.
- Burton N. Gates, Ph. D. Assistant Professor of Beekeeping.
- Bert C. Georgia, B. Sc. Instructor in Market Gardening.
- Harold M. Gore, B. Sc. Assistant in Physical Education.
- John C. Graham, B. Sc. Agr. Professor of Poultry Husbandry.
- Charles R. Green, B. Agr. Librarian.
- F. Josephine Hall, A. M., Waltham, Mass. Adviser for Women.
- Sidney B. Haskell, B. Sc. Associate Professor of Agronomy.
- Ernst Hermann, Newton, Mass. Director Playground Association.
- Curry S. Hicks, B. Sc. Assistant Professor of Physical Education and Hygiene.
- Lorian P. Jefferson, A. M. Expert Secretary, Division of Rural Social Science.
- Elizabeth Jenkins, Sandwich, Mass. Graduate Student, University of Wisconsin.
- William Chauncey Langdon, New York City, President, American Pageant Association.
- William P. B. Lockwood, B. Sc. Agr. Professor of Dairying.
- Frederick A. McLaughlin, B. Sc. Assistant in Botany.
- John A. McLean, A. B., B. Sc. Agr. Associate Professor of Animal Husbandry.
- Kathleen Marsh, Lowell, Mass. Lowell Normal School.
- C. J. Maynard, West Newton, Mass. Author and Lecturer on Bird Life.
- Orion A. Morton. Extension Professor of Agricultural Education.
- E. L. Morgan, A. M. Community Field Agent.
- Ethel H. Nash. Extension Assistant in Agricultural Education.
- Arno H. Nehrling. Assistant Professor of Floriculture.
- A. Vincent Osmun, M. Sc. Assistant Professor of Botany.
- Samuel R. Parsons, B. Sc. Instructor, Pennsylvania State College.
- Charles A. Peters, Ph. D. Associate Professor of Inorganic and Soil Chemistry.
- Edward Tallmadge Root, Boston, Mass. Secretary, Federation of Churches of Massachusetts and Rhode Island.
- Frederick W. Ried, Framingham, Mass. Director of Practical Arts, State Normal and Training Schools.
- Fred C. Sears, M. Sc. Professor of Pomology.
- Leone E. Smith, M. A. C. '14. Scout Master, Boys' Camps.
- George E. Stone, Ph. D. Professor of Botany.
- Frank A. Waugh, M. Sc. Head of Division of Horticulture and Professor of Landscape Gardening.

COMMITTEES OF THE SUMMER SCHOOL FACULTY

COURSES OF STUDY AND RECREATION

Professors Haskell, Graham, Cance, Hurd.

EXCURSIONS

Professors Osmun, Waugh, Hurd.

SOCIAL EVENINGS

Professors Sears, Hart, McLean, Hurd, Miss Hall.

ATHLETICS AND RECREATION

Professors Lockwood, Eyerly, Hicks, Hurd.

So far as possible, the members of the Summer School faculty are selected from the regular faculty of the College. Where instructors are engaged from other institutions, great care is taken to secure men and women eminent in their respective lines of work.

SUMMER SCHOOL OF AGRICULTURE AND COUNTRY LIFE

ANNOUNCEMENT

THE Summer School of Agriculture and Country Life of the Massachusetts Agricultural College will open June 30, for a term of four weeks, and will close July 28. This will be the seventh session of the Summer School. The experience of the past six years will aid in making material improvements for the session of 1914. The work of the Summer School was designed originally for school teachers, and the attendance has been largely of that class. Special attention will be given to the needs of teachers again this year. It has been found, however, that there are many persons who seek a general knowledge of theoretical and practical agriculture who can come to the college conveniently during the summer season. Extended courses will be offered for the benefit of such persons also. The courses offered for the current year may be grouped as follows:

1. Courses in practical agriculture and horticulture.
2. Courses in elementary sciences bearing on agriculture and horticulture.
3. Courses in agricultural education.
4. Courses in agricultural economics and rural sociology.
5. Courses on play and recreation.
6. Courses in domestic economy and household science.
7. Groups of courses, arranged especially for rural social workers, but open also to others interested in community development.

From these courses it will be possible to make up programs of work especially suitable to the needs of school teachers, principals, superintendents, school committeemen, farm owners, suburban residents, clergymen, social workers, and those who have only a general interest in agriculture. Persons who are in doubt as to what courses will suit their needs should correspond with the Director of the Summer School, who will gladly advise in all such matters.

GROUP A. GENERAL AGRICULTURE, DAIRYING AND ANIMAL HUSBANDRY.

1. *Soil Fertility.* A study of the factors governing crop production.

This course includes a field study of soils of different formations and different textures; a study of tillage, tillage methods, and tillage implements; a study of soil fertility as affected by crop rotations and green manures; and of the economical use of manures, lime and commercial fertilizer. A large part of the work consists of field exercises. Five exercises a week; four weeks.

PROFESSOR HASKELL.

2. *Breeds and Types of Livestock.* This course will deal with the different breeds and types of farm animals.

The characteristics of draft, coach, roadster and saddle horses with the different breeds and types of farm animals. The characteristics of draft, coach, roadster and saddle horses will be studied with a brief review of each of the breeds adapted for each class. The history, characteristics and adaptations of the leading dairy and beef breeds of cattle will be discussed. Feeding, especially of dairy cattle for economic milk production and care of management consistent with the successful growing of live stock will receive attention. Time will be given to the judging of horses and dairy cattle. The work will be made practical throughout. Five hours a week; four weeks.

PROFESSOR MCLEAN

3. *Modern Dairying.* A strictly up-to-date course in the production and handling of milk and cream, probably production and handling of milk and cream. The course will be practical rather than theoretical, and will cover briefly: composition and secretion of milk; principles and methods of creaming; abnormal milk and causes; proper handling of milk and cream on the farm; value of milk as food; relation of milk to the public health; handling and care of milk in the home; methods used in production of sanitary and certified milk. Five exercises a week; four weeks.

PROFESSOR LOCKWOOD.

4. *A Dairy Laboratory Course.* Consists of

First week—Two 2-hour periods in Babcock testing.

Second week—Two 2-hour " Market milk work.

Third week—Two 2-hour " Separator work.

Fourth week—Two 2-hour " Butter making.

Students taking this course are required to take Course

3. MR. COONS.

5. *Poultry Breeding and Management.* This course will cover the following subjects: Poultry house construction; incubation and breeding; care of poultry in summer; winter egg production; marketing eggs and poultry; poultry diseases. Laboratory work will consist of caring for incubators and brooders and managing young chicks. In addition to this, as much practical work as possible will be given. This will include poultry carpentry, caring for breeders and layers, also some elementary work in judging. Four lectures and one laboratory period a week; four weeks.

PROFESSOR GRAHAM.

GROUP B. HORTICULTURE, FORESTRY, LAND- SCAPE GARDENING

6. *Fruit Growing.* Modern methods of propagating, planting, cultivating, pruning, fertilizing and spraying fruit trees; planning and managing orchards; selling fruit. Lectures, demonstrations and field exercises. Five exercises a week; four weeks. PROFESSOR SEARS.

7. *Practical Gardening.* This course will consist almost wholly of practical field exercises in planting, training, cultivating, etc., and while no special effort will be made to put the work into common school form, the exercises will be especially valuable to school garden teachers. Limited to twenty pupils. Two lectures and three laboratory exercises a week; four weeks.

MR. GEORGIA.

8. *Amateur Floriculture.* A course in floriculture covering the subject of the growing of flowers in the home and in the garden. This course is designed to familiarize students with the subjects of containers, potting soils, fertilizers, insecticides, and with the preparation and planting of flower beds, and the propagation and culture of plants suitable for the window garden. A study of the varieties and culture of tender annuals and perennials will also be made. The work will be supplemented by discussions on the planning of formal flower gardens and informal borders. Lectures, demonstrations, and field trips. Five exercises a week; four weeks.

PROFESSOR NEHRLING.

FORESTRY

9. *Dendrology*. Short field trips will be made to identify and study the habits of growth of our native and commonly introduced species of trees. Five exercises a week; first two weeks. PROFESSOR CLARK.
10. *Silviculture*. A study of forests, forestry practices, and woodlot management. Field trips and lectures. A knowledge of trees is presupposed. Five exercises a week; second two weeks. PROFESSOR CLARK.

LANDSCAPE GARDENING.

11. *Garden Making*. Devoted chiefly to garden planning and the ways of making garden life popular and enjoyable, with such practical instruction as is necessary in the simpler forms of gardening. Five exercises a week; first two weeks. PROFESSOR WAUGH.
12. *Civic Improvement*. How to organize and carry on civic betterment; the various technical problems involved, the principles on which they are to be solved, with special reference to rural conditions. Five exercises a week; second two weeks. MR. ELWOOD.

GROUP C. SCIENCES RELATED TO AGRICULTURE

This year the course in elementary chemistry has been discontinued, and the two half-session courses in chemistry are strictly agricultural in character. While no definite prerequisite is necessary some knowledge of chemistry is desirable.

13. *Inorganic Agricultural Chemistry*.

- (a) Fertilizers
- (b) Insecticides
- (c) Soils

This course is intended for teachers of science in agricultural high schools, and for those working with orchards or soils. The work is correlated with that in the courses on fruits and on soils. All the principal salts used in making fertilizers are handled, and superphosphate, ammonium sulphate and potassium sulphate are prepared from their natural sources. The following insecticides and fungicides are made by each student: lead arsenate, lime-sulphur, Bordeaux mixture, Paris green. Some work is done to show the retention by the soil of the important constituents of plant food. The lectures are, for the most part, informal talks grouped about the preparations in hand. Five two-hour exercises a week; first two weeks.

PROFESSOR PETERS.

14. *Organic Agricultural Chemistry, Plants and Animals.*

This course, like Course 13, is intended primarily for teachers of agriculture and science in secondary schools. It is supplementary to Course 13. Plants will be studied as to their composition and their relation to

- (a) soil and climate as affecting their composition,
- (b) manufactured products, such as alcohol, vinegar, sugar, starch, cellulose, dynamite, etc.
- (c) animals as animal food.

Animals will be studied as to their composition and digestive processes. Animal foods and feeding will be studied as to the relation between plants and animals, and the function of the different nutritive constituents of plants in producing certain results in animals. The nutritive value of foods and the computation of rations will be emphasized. The work will be largely individual experimentation in the laboratory, and experiments will be given which may be easily reproduced in secondary school teaching. The lectures will be explanatory of the laboratory work, and will correlate it with general facts and principles. Five two-hour periods a week; second two weeks. PROFESSOR CHAMBERLAIN.

15. *Plant Experiments and School Demonstration Material.*

A lecture course illustrated by simple experiments in plant life, with home-made apparatus and methods of preparing plant material useful in schools, such as seeds and seedlings, common plant diseases, etc. A valuable course for science teachers and others interested in plant life. Five exercises a week; first two weeks.

PROFESSOR STONE AND MR. McLAUGHLIN.

16. *General Botany.* Morphology, physiology and ecology of higher plants. This course is especially suited to the needs of teachers of science and nature study and to amateur botanists. Previous training in the subject is not required. Five lectures a week; second two weeks.

PROFESSOR OSMUN.

17. *Cryptogamic Botany.* - This is largely a laboratory course, consisting of microscopic and field study of lower forms of plant life, including algae, fungi, mosses and ferns. The major portion of the time may be devoted to some special group, such as the ferns, if desired by the class. Previous training in botany is re-

- quired. Limited to twenty pupils. Three two-hour exercises; second two weeks. PROFESSOR OSMUN.
18. *Bird Life*. A study of the local bird fauna, conducted largely in the field. Special attention is given to economic relations of the birds and to nesting habits. Five exercises a week; first two weeks. MR. MAYNARD.
19. *Insect Life*. An introductory course arranged with particular reference to the needs of teachers in grade schools and high schools who are expected to treat of insects in their classes, either as a part of nature study or in their relation to agriculture. The course is also planned for persons, not teachers, who wish a general knowledge of insect pests and their methods of control. A part of the time will be spent in the field, studying living insects, their habits, the injuries they cause, and how to distinguish them. Four class exercises and one field period a week; four weeks. PROFESSOR FERNALD.
20. *Entomology*. This course though planned to follow the last, can be taken with it if desired and includes investigation of the life histories of important pests, a study of the structure of insects as related to methods for their control, and the materials and methods used in checking insect ravages. This course supplements the other and is also more distinctly economic in its nature. Two lectures and two laboratory periods a week; four weeks. PROFESSOR FERNALD.
21. *Beekeeping*. A course designed particularly for school teachers or beginners in the subject. It comprises the elementary and practical features of the beekeeping industry, including equipment, handling and manipulation of bees, essential apparatus; also a discussion of the diseases and races of the honey bee; the utilization of bees as nature study material in the lecture and school room, as well as for pleasure. Five lectures and such laboratory periods as can be arranged each week; second two weeks. PROFESSOR GATES AND MR. BYARD.
22. *Handicrafts and Practical Arts*. A course to include design and its application to rural school projects, such as binding and its various problems, basketry, elementary weaving, thin and thick cardboard construction, leather work, bagging projects and rural dyeing; also other phases of rural pre-vocational subject matter, also rural avocational craft-work. Five exercises a week; four weeks. MR. RIED.

23. *Farm Management.* The object of this course is to discuss the principles which govern successful farming. Five lectures a week; first two weeks. MR. BAKER.
24. *Farmers' Exchanges.* Ten lectures on the possibilities, methods and benefits of farmers' exchanges for purchasing supplies, selling milk, eggs, poultry, fruit and other farm products; for building storages; for utilizing surplus and unmarketable products, and for forming community breeding associations, boys' marketing clubs, and the like; how to form them; how to run them successfully. Five exercises a week; second two weeks. PROFESSOR FERGUSON.

GROUP D. HOME ECONOMICS.

25. *General Home Economics.* Food principles governing a normal diet; the construction of menus; cost of raw materials and cost of preparation will be discussed during the first two weeks. The third week the lectures will deal with house construction and remodeling, house sanitation and house decoration. The last week will be given to general topics in household administration, such as system, labor saving appliances and account keeping. Demonstrations on jelly making, fruit and vegetable canning, salads, meats and breads will be given. Five lectures and two demonstrations a week; four weeks. PROFESSOR COMSTOCK AND ASSISTANT.
26. *Cookery.* This course offers a study in principles of cookery and balanced ration, and a consideration of three meals a day from the dietetic, aesthetic and economic standpoints. The demonstrations in Course 25 are open to women taking this work. Five lectures a week; second two weeks. PROFESSOR COMSTOCK.
27. *Practical Nursing.* The sick room and its appointments, bed making, fumigation, contagious diseases and emergencies in their home connection will be discussed. Three lectures a week; first two weeks. PROFESSOR COMSTOCK.
28. *Home Economics for Rural and Small Village Schools.* The lectures and demonstrations in this course are given primarily to assist teachers in adapting home economics lessons to rural needs. Twelve hours will be given to the discussion of food principles and the physiology of nutrition, with demonstrations; five hours to sanitation, hygiene and prevention of diseases; three

hours to sewing and other forms of handwork. Five lectures and three demonstrations a week; four weeks.

PROFESSOR COMSTOCK AND ASSISTANT.

29. *Correlation of Home Economics.* This course is designed for rural teachers and consists of ten lectures treating of the relationship between home economics and such subjects as schoolhouse decorations, school grounds, school gardens, the noon lunch and the three R's. A study will also be made of equipment suitable for rural schools. Five lectures a week; second two weeks.

MISS NASH, MISS MARSH.

GROUP E. AGRICULTURAL EDUCATION.

30. *Pedagogy of Agriculture.* This course will include the main problems of rural school supervision, the teaching of agriculture and related sciences, the course of study, preparation of teachers, etc. Five exercises a week; first two weeks.

PROFESSOR HART.

31. *School and Home Gardens.* This course will offer opportunity for practical experience in school gardening; supervision and inspection of both home gardens and school gardens. Five exercises a week; four weeks.

PROFESSORS HART AND MORTON.

32. *Boys' and Girls' Clubs.* This course will include a survey of the history and significance of the agricultural club movement, its scientific and vocational value in the education of the child, its relation to the work of the school, its relation to agricultural industry and rural life, etc. Five exercises a week; second two weeks.

PROFESSOR MORTON.

GROUP F. ORGANIZED PLAY AND RECREATION.

33. *School Hygiene and Recreation.* This course will consist of lectures on rural school hygiene and sanitation; demonstrations of plays and games for children in rural schools. Five exercises a week; first two weeks.

PROFESSOR HICKS.

34. *Organized Play and Recreation.* A course discussing the place which organized play may take in community development. Such subjects as methods of organizing and directing games, athletics, festivals and pageantry will be taken up. Demonstrations will be given. Five lectures a week with extra afternoon demonstrations; second two weeks.

MR. HERMANN.

GENERAL PLAN OF THE SUMMER SCHOOL WORK

The formal instruction in the Summer Schools is given in definite courses herein described. From these each pupil may elect courses of not less than ten or more than fifteen exercises a week, unless a larger or smaller amount of work is especially allowed by the Director. These courses include a large amount of field work, observation trips, outdoor exercises and laboratory experiments.

Besides these, general field exercises will be arranged for one afternoon of each week. These will be on topics of interest to all. Excursions will be arranged for every Wednesday afternoon, and more extended excursions for the whole school will be planned for every Saturday. The excursions will be in charge of an instructor.

Round table and special discussions will be arranged by various instructors as their courses require.

A course of evening lectures on popular topics relating to the work of the school will be a feature of the general program. Like everything else connected with the Summer School, this lecture course is entirely free to all students.

COLLEGE EQUIPMENT

The Massachusetts Agricultural College is maintained by the Federal government and by the State of Massachusetts for teaching and investigation in agriculture in the broadest sense. The College has over 500 acres of land most of which is in a high state of cultivation and illustrates all the leading agricultural industries of Massachusetts and some of the best agricultural specialties. There is a large range of greenhouses of the most modern and approved type; there is a modern dairy barn with dairy cattle; there are good horses, pure-bred swine, sheep and poultry; there are fields of corn, potatoes, clover and grass in season; orchards of apple, peach, plum and pear trees; tracts of good forest land, nurseries, market gardens; in addition, a good school garden, maintained by co-operation between the College and the Amherst schools, will be in operation. There are also considerable tracts devoted to experiments, many of which are of unusual interest. Then there are well-equipped departments of botany, entomology and chemistry, dealing in the most thorough manner with these

(Continued on page 18)

Summer School Schedule, 1914

	8:20—9:15	9:25—10:15	10:25—11:15	11:25—12:15	Afternoon
Monday	1 Soil Fertility 4 weeks 2 Amateur Floriculture 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 19 Insect Life 4 weeks 25 Home Economics 4 weeks 28 Home Economics (laboratory) 4 weeks 33 School Hygiene and Recre. 1st 2 weeks 34 Organized Play and Recreation 2nd 2 weeks 35 Rural Sociology 2nd 2 weeks 38 Redirection of Rural School begins July 15 39 Rural Leadership begins July 15 41 Country Girl and Country Woman begins July 22 45 Pageantry begins July 22	2 Breeds and Types of Livestock 4 weeks 6 Fruit Growing 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 16 General Botany 2nd 2 weeks 22 Handicrafts 4 weeks 26 Cookery 2nd 2 weeks 28 Home Economics (laboratory) 4 weeks 33 School and Home Gardens 4 weeks 34 Co-operation in Agric. begins July 15 37 Economic Aspects of N. E. Agric. begins July 22 41 Development of Community begins July 15 42 Community Program begins July 22	7 Modern Dairying 4 weeks 9 Poultry Breeding and Man'g't 4 weeks 10 Practical Gardening (laboratory) 4 weeks 17 Garden Making 1st 2 weeks 18 Civic Improvement 2nd 2 weeks 21 Plant Experiments 1st 2 weeks 23 Cryptogamic Botany 2nd 2 weeks 24 Entomology 1 weeks 25 Nursing 1st 2 weeks 28 Correlation of Home Econ. 2nd 2 weeks 37 Pedagogy of Agriculture 1st 2 weeks 41 Boys' and Girls' Clubs 2nd 2 weeks 45 Rural Church begins July 15	7 Dendrology 4 weeks 9 Silviculture 1st 2 weeks 10 Cryptogamic Botany 2nd 2 weeks 17 Bird Life 1st 2 weeks 18 Beekeeping 2nd 2 weeks 23 Farm Management 1st 2 weeks 24 Farmers' Exchange 2nd 2 weeks 25 Home Econ. Village Schools 4 weeks 28 Rural Survey begins July 22 33 Rural Problem begins July 15 37 Rural Program begins July 22	4 Dairying (laboratory) 1.30-3.30 4 weeks Educational Trips Class Conferences
Tuesday	1 Soil Fertility 4 weeks 2 Amateur Floriculture 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 19 Insect Life 4 weeks 25 Home Economics 4 weeks 28 Home Economics (laboratory) 4 weeks 33 School Hygiene and Recreation 1st 2 weeks 34 Organized Play and Recreation 2nd 2 weeks 35 Rural Sociology 2nd 2 weeks 38 Redirection of Rural School begins July 15 39 Rural Leadership begins July 15 41 Country Girl and Country Woman begins July 22 45 Pageantry begins July 22	2 Breeds and Types of Livestock 4 weeks 6 Fruit Growing 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 16 General Botany 2nd 2 weeks 22 Handicrafts 4 weeks 26 Cookery 2nd 2 weeks 28 Home Economics (laboratory) 4 weeks 33 School and Home Gardens 4 weeks 34 Co-operation in Agriculture 4 weeks 37 Economic Aspects of N. E. Agric. begins July 15 41 Development of Community begins July 15 42 Community Program begins July 22	7 Modern Dairying 4 weeks 9 Poultry Breeding and Management 4 weeks 10 Practical Gardening (laboratory) 4 weeks 17 Garden Making 1st 2 weeks 18 Civic Improvement 2nd 2 weeks 21 Plant Experiments 1st 2 weeks 23 Cryptogamic Botany 2nd 2 weeks 24 Entomology (laboratory) 1 weeks 25 Nursing 1st 2 weeks 28 Correlation of Home Economics 2nd 2 weeks 37 Pedagogy of Agriculture 1st 2 weeks 41 Boys' and Girls' Clubs 2nd 2 weeks 45 Rural Church begins July 15	7 Dendrology 4 weeks 9 Silviculture 1st 2 weeks 10 Cryptogamic Botany 2nd 2 weeks 17 Bird Life 1st 2 weeks 18 Beekeeping 2nd 2 weeks 23 Farm Management 1st 2 weeks 24 Farmers' Exchange 2nd 2 weeks 25 Home Economics for Village Schools 4 weeks 28 Rural Survey begins July 22 33 Rural Problem begins July 15 37 Rural Program begins July 22	4 Dairying (laboratory) 1.30-3.30 Organized play and recreation 3.30
Wednesday	1 Soil Fertility 4 weeks 2 Amateur Floriculture 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 19 Insect Life 4 weeks 25 Home Economics 4 weeks 28 Home Economics (laboratory) 4 weeks 33 School Hygiene and Recreation 1st 2 weeks 34 Organized Play and Recreation 2nd 2 weeks 35 Rural Sociology 2nd 2 weeks 38 Redirection of Rural School begins July 15 39 Rural Leadership begins July 15 41 Country Girl and Country Woman begins July 22 45 Pageantry begins July 22	2 Breeds and Types of Livestock 4 weeks 6 Fruit Growing 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 16 General Botany 2nd 2 weeks 22 Handicrafts 4 weeks 26 Cookery 2nd 2 weeks 28 Home Economics (laboratory) 4 weeks 33 School and Home Gardens 4 weeks 34 Co-operation in Agriculture 4 weeks 37 Economic Aspects of N. E. Agric. begins July 15 41 Development of Community begins July 15 42 Community Program begins July 22	7 Modern Dairying 4 weeks 9 Poultry Breeding and Management 4 weeks 10 Practical Gardening (laboratory) 4 weeks 17 Garden Making 1st 2 weeks 18 Civic Improvement 2nd 2 weeks 21 Plant Experiments 1st 2 weeks 23 Cryptogamic Botany 2nd 2 weeks 24 Entomology (laboratory) 1 weeks 25 Nursing 1st 2 weeks 28 Correlation of Home Economics 2nd 2 weeks 37 Pedagogy of Agriculture 1st 2 weeks 41 Boys' and Girls' Clubs 2nd 2 weeks 45 Rural Church begins July 15	7 Practical Gardening (laboratory) 4 weeks 9 Dendrology 4 weeks 10 Silviculture 1st 2 weeks 17 Cryptogamic Botany 2nd 2 weeks 18 Bird Life 1st 2 weeks 21 Beekeeping 2nd 2 weeks 23 Farm Management 1st 2 weeks 24 Farmers' Exchange 2nd 2 weeks 25 Home Economics for Village Schools 4 weeks 28 Rural Survey begins July 22 33 Rural Problem begins July 15 37 Rural Program begins July 22	Regular mid-week excursion
Thursday	1 Soil Fertility 4 weeks 2 Amateur Floriculture 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 19 Insect Life 4 weeks 25 Home Economics 4 weeks 28 Home Economics (laboratory) 4 weeks 33 School Hygiene and Recreation 1st 2 weeks 34 Organized Play and Recreation 2nd 2 weeks 35 Rural Sociology 2nd 2 weeks 38 Redirection of Rural School begins July 15 39 Rural Leadership begins July 15 41 Country Girl and Country Woman begins July 22 45 Pageantry begins July 22	2 Breeds and Types of Livestock 4 weeks 6 Fruit Growing 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 16 General Botany 2nd 2 weeks 22 Handicrafts 4 weeks 26 Cookery 2nd 2 weeks 28 Home Economics (laboratory) 4 weeks 33 School and Home Gardens 4 weeks 34 Co-operation in Agriculture 4 weeks 37 Economic Aspects of N. E. Agric. begins July 15 41 Development of Community begins July 15 42 Community Program begins July 22	7 Modern Dairying 4 weeks 9 Poultry Breeding and Management 4 weeks 10 Practical Gardening (laboratory) 4 weeks 17 Garden Making 1st 2 weeks 18 Civic Improvement 2nd 2 weeks 21 Plant Experiments 1st 2 weeks 23 Cryptogamic Botany 2nd 2 weeks 24 Entomology (laboratory) 1 weeks 25 Nursing 1st 2 weeks 28 Correlation of Home Economics 2nd 2 weeks 37 Pedagogy of Agriculture 1st 2 weeks 41 Boys' and Girls' Clubs 2nd 2 weeks 45 Rural Church begins July 15	7 Dendrology 4 weeks 9 Silviculture 1st 2 weeks 10 Cryptogamic Botany 2nd 2 weeks 17 Bird Life 1st 2 weeks 21 Beekeeping 2nd 2 weeks 23 Farm Management 1st 2 weeks 24 Farmers' Exchange 2nd 2 weeks 25 Home Economics for Village Schools 4 weeks 28 Rural Survey begins July 22 33 Rural Problem begins July 15 37 Rural Program begins July 22	Organized play and recreation 3.30 Regular evening lecture 7.30 P. M.
Friday	1 Soil Fertility 4 weeks 2 Amateur Floriculture 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 19 Insect Life 4 weeks 25 Home Economics 4 weeks 28 Home Economics (laboratory) 4 weeks 33 School Hygiene and Recreation 1st 2 weeks 34 Organized Play and Recreation 2nd 2 weeks 35 Rural Sociology 2nd 2 weeks 38 Redirection of Rural School begins July 15 39 Rural Leadership begins July 15 41 Country Girl and Country Woman begins July 22 45 Pageantry begins July 22	2 Breeds and Types of Livestock 4 weeks 6 Fruit Growing 4 weeks 13 Inorganic Chemistry 1st 2 weeks 14 Organic Chemistry 2nd 2 weeks 16 General Botany 2nd 2 weeks 22 Handicrafts 4 weeks 26 Cookery 2nd 2 weeks 28 Home Economics (laboratory) 4 weeks 33 School and Home Gardens 4 weeks 34 Co-operation in Agriculture 4 weeks 37 Economic Aspects of N. E. Agric. begins July 15 41 Development of Community begins July 15 42 Community Program begins July 22	7 Modern Dairying 4 weeks 9 Poultry Breeding and Management (lab.) 4 weeks 10 Practical Gardening (laboratory) 4 weeks 17 Garden Making 1st 2 weeks 18 Civic Improvement 2nd 2 weeks 21 Plant Experiments 1st 2 weeks 23 Cryptogamic Botany 2nd 2 weeks 24 Insect Life (laboratory) 1 weeks 25 Nursing 1st 2 weeks 28 Correlation of Home Economics 2nd 2 weeks 37 Pedagogy of Agriculture 1st 2 weeks 41 Boys' and Girls' Clubs 2nd 2 weeks 45 Rural Church begins July 15	7 Practical Gardening (laboratory) 4 weeks 9 Dendrology 4 weeks 10 Silviculture 1st 2 weeks 17 Cryptogamic Botany 2nd 2 weeks 18 Bird Life 1st 2 weeks 21 Insect Life (laboratory) 2nd 2 weeks 23 Beekeeping 1st 2 weeks 24 Farm Management 2nd 2 weeks 25 Farmers' Exchange 1st 2 weeks 28 Home Economics for Village Schools 4 weeks 33 Rural Survey begins July 22 37 Rural Problem begins July 15 41 Rural Program begins July 22	Educational trips Class conferences Social evenings 3 P. M.
Saturday	All day Excursions				

special sciences. All of this equipment (much more than can be described or even named) is placed at the service of the Summer Schools.

ELECTION OF COURSES

Election of courses should be made at the time of registration. Every election is subject to the approval of the Director and of the instructor whose course is elected. As it will be necessary to schedule several courses at the same time, certain combinations of courses will be made unavailable. It should be specially noticed that certain courses are offered to a limited number of pupils only, and as a rule pupils will be accepted in these courses in the order of application. Each pupil should choose such combinations of courses as will keep two or three subjects in hand at the same time. This will meet the requirement that each one must take at least ten and not more than fifteen exercises a week, unless permitted to take more or less by special order of the Director. See Schedule of Courses and hours at which they come on two preceding pages.

GROUPING OF COURSES

Those desiring work in general agriculture and animal husbandry should elect from courses No. 1, 2, 3, 4, 5, 23, 24.

Those desiring work in horticulture and forestry should elect from courses No. 1, 6, 7, 8, 9, 10, 23, 24.

Those desiring work in home economics should elect from Numbers 25, 26, 27, 28, 29.

Those desiring to train themselves for supervising playgrounds and gardens from Numbers 1, 8, 11, 12, 18, 19, 22, 29, 30, 31, 32, 33, 34.

Those interested in high school science should elect from Numbers 1, 13, 14, 15, 16, 19, 20, 30.

Those interested in rural sociology, agricultural economics and leadership in country life should elect from Numbers 28, 29, 31, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47.

REGISTRATION, ATTENDANCE, ETC.

Those who expect to attend should register as early as possible. REGISTRATION FEE FOR THE SUMMER SCHOOL OF AGRICULTURE AND COUNTRY LIFE IS \$5, PAYABLE AT THE TIME APPLICATION IS MADE. REGISTRATION FEE FOR THE CLERGYMEN ATTENDING THE COURSES AND CONFERENCES GIVEN ESPECIALLY FOR THEM IS \$1. No tuition

fee is charged. Remittance should accompany application blanks and should be made payable to the College Treasurer. A Summer School registration blank will be found in the back part of this bulletin. Registration fees will be refunded to those who find it impossible to attend the school.

Attendance will be required in the courses elected. Some sort of examination, test or permanent note book will be required in each course. Those who complete at least three courses in a satisfactory manner, including practically perfect attendance, will be given certificates at the close of the term.

There are no rules or regulations. This absence of rules has worked admirably in the past, and it gives everyone a sense of freedom based on personal responsibility, the basis of all proper government, whether in school, college or the community.

TUITION IS ABSOLUTELY FREE, and there are no incidental charges. The College is supported by the State and the Federal governments, and receives no payments whatever from Summer School pupils except for room, board, and the registration fee.

ROOMS AND BOARD

Rooms will be provided in the College dormitories and in private homes adjoining the College grounds. In general, the dormitory rooms are in suites of two bedrooms, opening into one study room, the bedrooms furnished with single beds. These rooms are nearly all located in two dormitories known as North College and South College and are reserved for women students exclusively. The toilet and bathrooms are in the basements; water is not provided in the rooms. While the appointments in general are not those of a high-priced summer hotel, they are sanitary and comfortable, and have been found pleasant to men students for many years and by the women students of the Summer School during four summers. A uniform rate of \$1.25 a week for each person will be charged for these rooms, and each pupil will be expected to supply her own blankets, sheets, pillow cases, towels and napkins. Convenient arrangements for laundry work may be made in Amherst.

ALL REQUESTS FOR DORMITORY ROOMS MUST BE MADE TO, AND ROOMS WILL BE ASSIGNED BY, THE COLLEGE TREASURER. A DEPOSIT OF \$2.00 IS REQUIRED IN ORDER TO HAVE A ROOM IN A DORMITORY RESERVED. THIS DEPOSIT IS NOT REFUNDED TO THOSE WHO FIND IT IMPOSSIBLE TO ATTEND.

The College will also supply a small number of first-class United States army wall tents for those who wish them. Each tent will accommodate two persons. The tents will be placed in a pleasant and convenient location on the College campus, and every reasonable provision will be made for the comfort of the occupants. This form of domicile has been found very acceptable in other summer schools, chatauquas and camps. Those who care for real outdoor life at its best will find these arrangements genuinely enjoyable. The charge for these tents will be \$1 a week for each person.

Rooms outside the College vary considerably in their accommodations and somewhat in price, the charge ranging from \$1.50 to \$2.50 a week for each person. A LIST OF AVAILABLE ROOMS IN THE VILLAGE WILL BE FURNISHED SUMMER SCHOOL STUDENTS AT THE TIME OF REGISTRATION. EVERY EFFORT WILL BE MADE BY THOSE IN CHARGE TO SEE THAT EVERYONE HAS COMFORTABLE ACOMMODATIONS.

A few furnished houses are usually available in Amherst during July and August at reasonable rentals.

As far as possible, everyone who registers at the Summer School will be allowed to select his or her own room, either in the College dormitories or outside, and such selections will be offered strictly in the order of registration. The Summer School management, however, reserves the right to make such readjustments as may be necessary for the greater convenience and comfort of all.

Good meals are served in Draper Hall, on the College grounds. Meals will be served on an à la carte basis at very low cost and should not amount to more than \$4.00 or \$4.50 a week. Good boarding places can be secured outside the College if desired.

ATHLETICS AND RECREATION

Athletics and sports of various kinds occupy a prominent place in the Summer School. Tennis tournaments for both men and women and baseball teams are organized.

Contests with teams from nearby towns are held, subject to the approval of the proper committee. This year, under competent supervision, demonstrations of organized play, recreation, folk dancing, and so forth will be given. Late afternoon and early evening periods will be used for this purpose.

The region around Amherst is especially rich in attractive places for tramping, excursions and picnics. The management of the Summer School usually arranges plenty of this form of recreation.

EVENING LECTURES AND SOCIAL LIFE

The management of the Summer School provides at least one evening lecture each week. These lectures are usually given by men of national repute and deal with practical, social and economic subjects related to rural life.

One or two social evenings are arranged for each week. These, together with evening lectures, the regularly scheduled Wednesday and Saturday excursions, the afternoon field trips for study, make life at the Summer School extremely enjoyable as well as profitable. These social evenings are under the direction of a committee of the faculty, working with the Summer School students.

(For Summer School application blank see last page of bulletin.)

(For Schedule see pages 16 and 17.)

SCHOOL FOR RURAL SOCIAL SERVICE JULY 15-JULY 28th INCLUSIVE

This year special emphasis will be laid upon the group of courses given especially for those who might be classed as rural social workers. These courses are intended for clergymen, teachers, librarians, town officers, grange workers and others who devote a considerable portion of their time to problems of community development.

From all these courses a group of studies may be easily arranged which will present the rural problem from several standpoints, and will serve to show the relationships of the workers in the different lines to their respective fields and to the larger community problems which are constantly being presented to them.

COURSES IN THE SCHOOL FOR RURAL SOCIAL SERVICE

35. *Constructive Rural Sociology.* This course is an exposition of the fundamental principles underlying the constructive side of the "rural problem." The following topics will be treated: meaning and importance of rural sociology, advantages and disadvantages of farm life, improvements of transportation and communication, social aspects of land and labor, rural health and sanitation, making farm life more attractive, the socialization of the country, rural social institutions and their improvement, rural charity and correction, rural social surveys. Five lectures a week beginning July 15th.

PROFESSOR EYERLY.

36. *Co-operation in Agriculture.* This course discusses the principles and practice, methods and benefits of organized agriculture for profit. Co-operative buying and selling, co-operative production and co-operative rural credit will be considered. A thoroughly practical discussion based on personal studies in Europe and the United States. Five lectures, beginning July 15th.

PROFESSORS CANCE AND FERGUSON.

37. *Economic Aspects of New England Agriculture.* This course will develop the characteristics of agriculture as an industry, the New England market for farm products, better methods of disposing of produce, the

farmers' market, the problem of transportation and the supply of farm labor. Five lectures, beginning July 22nd. PROFESSORS CANCE AND FERGUSON.

38. *The Redirection of the Rural School.* This course will in five lectures take up the following subjects:

Adjustment of the Course of Study in the Rural School to the Needs of the Rural Community.

Location and Equipment of the Rural School Plant.

Methods of Supervision and Instruction in Rural Schools.

Preparation and Qualifications of Rural School Teachers.

The Place of the Rural School in the Social Organism.

Five lectures, beginning July 15th. PROFESSOR HART.

39. *Principles of Rural Leadership Training.* This course will discuss the problem of the country in terms of leadership, a study of the small voluntary group, an analysis of the types of leaders demanded and the methods of discovering, enlisting and training these leaders. The point of view is that of the typical rural village and farm community. Particular emphasis will be given to the practical side of the question and concrete illustrations will furnish the background around which the course is built. The course is especially arranged to be of service to those who are occupying positions of leadership in the religious, educational and social life of the rural community. Five lectures, beginning July 15th. MR. BOARDMAN.

40. *Problems of the Rural Church.* This course will take up the subject from the standpoint of the sociological approach to the actual work of religious organizations and will give constructive suggestions regarding the difficulties and possibilities of the rural church as a community-serving enterprise. Ten lectures, beginning July 15th. PROFESSOR FISKE.

41. *The Development of the Community.*

(a) The rural mind; influences that form the rural mind; its characteristics; its influence upon a community development program.

(b) The rural problem; brief statement of the general social and economic problem showing

differences in different sections of the country and extent to which these influence the type of community development which may be accomplished.

- (c) The rural social forces; an enumeration of the social forces of the rural community showing their relative places, extent to which they must be reckoned with and federated.
- (d) The rural social agents; the function of the local worker, the local leader and the social engineer as factors in the development of the community.
- (e) Practical leadership training; discovering, enlisting, developing and training local leaders to assume local responsibility.

Five lectures, beginning July 15th.

MR. MORGAN.

42. The Community Program.

- (a) The goal in rural social life; the ultimate goal to be attained by a given community, namely that of an harmonious working together of the social forces in a constructive long-term program.
- (b) The spirit necessary on the part of the community.
- (c) The social survey; a statement of the information wanted, methods of making the survey, how the facts may be incorporated.
- (d) The making of a community program; some methods used in Massachusetts.
- (e) The Massachusetts plan; the plan of federation, town, county, and state; methods of maintaining the community program by means of the annual mass meeting; the plan of the county and state program as worked out and applied in Massachusetts.

Five lectures, beginning July 22nd.

MR. MORGAN.

43. The Rural Survey in Community Service. A course of lectures on the purposes, methods and practical value of surveys of various phases of rural life. The following

subjects will be treated by persons who have outlined and conducted surveys for specific purposes:

- | | |
|---------------------------------|-----------------|
| 1. The Survey Idea, | Professor Cance |
| 2. Farm Management Surveys, | Mr. Baker |
| 3. Social Surveys, | Mr. Morgan |
| 4. Educational Surveys, | Miss Jefferson |
| 5. Moral and Religious Surveys, | Mr. Root |

Five lectures, beginning July 22nd.

44. *The Country Girl and the Country Woman.* The education of the country girl, an analysis of the problem, certain present day attempts to meet it, the wider scope of home making courses.

The farm woman, her relation to the family, farm and state, social opportunities, education which makes more capable housekeepers and gives training for broader living, economic function of woman in the household and on the farm.

Three lectures by MISS JENKINS and two by MISS BUELL, beginning July 22nd.

45. *Play, Pageantry and Festivals.* The organization, the music, the costuming, etc. of plays, festivals and pageants. The place these may be made to occupy in community development. Five lectures, beginning July 22nd.

MR. LANGDON.

46. *Rural Community Building—The Rural Problem.* A brief analysis of the main elements in the question of rural development in America. The main topics treated are the improvement of farming; the betterment of country life; the rural adjustment in its various forms. Five lectures, beginning July 15th.

PRESIDENT BUTTERFIELD.

47. *Rural Community Building—A Rural Program.* This course is intended as a sketch of the fundamental principles of a rural policy, and covers such themes as rural community building; the county work; a rural policy for Massachusetts; a national statesmanship in rural affairs. Five lectures, beginning July 22nd.

PRESIDENT BUTTERFIELD.

NOTE—*Additional Courses Available.*

Besides these courses the following courses given in the regular "Summer School of Agriculture and Country

Life" will be available between the dates of July 15th to July 28th inclusive. These are fully described earlier in this bulletin.

- Course 10.* Silviculture
- Course 12.* Civic Improvement
- Course 16.* General Botany
- Course 17.* Cryptogamic Botany
- Course 21.* Beekeeping
- Course 24.* Farmers' Exchanges
- Course 26.* Cookery
- Course 29.* Correlation of Home Economics
- Course 32.* Boys' and Girls' Clubs
- Course 34.* Organized Play and Recreation

REGISTRATION FEES—LIVING ACCOMMODATIONS, ETC.

A Registration fee of one dollar will be charged those who attend the "School for Rural Social Service."

Board can be had at the College Dining Hall at \$4.00 to \$5.00 a week on à la carte plan.

So far as possible fraternity houses will be engaged for those who attend this school. This will permit groups of considerable size to live together. Rooms in these fraternity houses, and in residences in the village may be had at a cost of \$1.50 to \$2.50 a week for each person.

For more extended description of living accommodations see other parts of this bulletin.

BOYS' AGRICULTURAL CAMPS

ANNOUNCEMENT

During the month of July three camps for boys will be maintained at the Massachusetts Agricultural College in connection with the regular Summer School of Agriculture and Country Life.

The purpose of these camps is fourfold:

1. To interest the boy in agricultural and rural life. This is the primary object.
2. To impress on the boy his responsibilities as a member of society.
3. To teach the boy clean, wholesome sports, recreation and proper spirit in competitive contests.
4. To demonstrate the value of a Boys' Camp as an educational factor.

The camps will be under strict military discipline. The daily program will consist of instruction in agriculture, hygiene, citizenship, etc., each forenoon. The afternoon and evening will be given over to organized play, recreation, games, tramps through the hills, evening camp fires, etc., all managed and directed by experts.

Shelter will be provided by tents. Meals will be furnished at the College dining hall.

Each camp will be limited to thirty boys.

Only boys between the ages of twelve and seventeen will be admitted.

One change of outer clothing, necessary under clothing, blankets and towels, comb, brush, etc., must be brought by each boy.

Eight dollars will be charged each boy for the week. This will be used to help defray cost of maintenance, board, instruction and supervision.

DATES OF THE CAMPS

FIRST CAMP.—June 30-July 8.

Registration closes June 20.

SECOND CAMP.—July 10-18.

Registration closes July 1.

THIRD CAMP.—July 20-28.

Registration closes July 10.

NOTE.—Boys who were in the 1913 Boys' Camp will be admitted to Third Camp only.

SUPERVISORS OF THE BOYS' CAMPS

WILLIAM D. HURD: Director of the Extension Service.

SAMUEL R. PARSONS Ex-Colonel, M. A. C. Battalion and assistant in military science; instructor, Penn. State College.

HAROLD M. GORE. Assistant in Physical Education.

LEONE E. SMITH, M. A. C., 1914: Scout master.

The athletics will be under the direction of Prof. Curry S. Hicks, head of the Department of Physical Education.

The Agricultural Instruction will be given by members of the regular M. A. C. faculty.

Well-known, non-resident lecturers and leaders in boys' work will be secured for other exercises.

ORGANIZATION OF THE CAMP, DISCIPLINE, ETC.

The camps will be conducted under military discipline. Only those boys who are willing to conduct themselves in a proper manner and observe the rights and comforts of others are invited to join the camps. All members of the camps are required to attend and to participate in all meetings planned unless prevented by illness.

A letter telling fully what to bring and directions for reaching Amherst, time at which boys are expected to arrive, and other information will be sent those who register, a few days prior to the opening of each camp.

SELECTION OF BOYS

The selection of boys who are to receive the advantages of these camps will be left to individuals and various organizations which may be interested. Granges, religious organizations, Scout Masters, Clergymen, Teachers and Superintendents are urged to select boys who will be benefited by a week of this kind of work, and to see that they are provided with the necessary means.

See time limit for registration under Dates of the Camps.

GAMES AND RECREATION

The afternoons will be spent in athletic sports, baseball games, quoit tournaments, tennis tournaments, bird hikes, botany trips, scouting games, and other activities.

The boys will be graded according to age and weight and there will be a baseball league for both the younger and older boys. Two baseball diamonds are available; bring gloves, masks and baseballs.

The events for the field day will include the dashes, running high jump, running broad jump, shot put and baseball throw.

TENTATIVE PROGRAM OF A DAY AT "BOYS' CAMPS"

- 6.30 A. M. "Reveille"—Setting up exercises, shower baths, dress.
- 7.00 A. M. Flag Raising.
- 7.15 A. M. Breakfast—Announcements for the day.
- 8.00 A. M. Camp Duties—"picking up."
- 8.30 A. M. Agricultural Lesson.
- 10.00 A. M. "Prepare for Inspection"—Make beds.
- 10.30 A. M. Morning Talk.
- 12.00 M. Tent Inspection.
- 12.15 P. M. Dinner.
- 1.00 P. M. "Quiet Hour"—Rest in tent, read, write letters home, study in library.
- 2.00 P. M. Games and Recreation—Tennis, baseball, track, swimming.
- 4.30 P. M. Afternoon Specialties—Basketry, surveying, photography, stock judging, etc.
- 6.00 P. M. Supper.
- 6.45 P. M. "Colors."
- 7.00 P. M. Evening Specialty — Games, wig-wagging, "Weatherman," rope-tying, etc.
- 7.30 P. M. Evening Lecture or Open Night—Campfire, roasts, vaudevilles, etc.
- 9.15 P. M. "Tattoo"—Everybody in tents.
- 9.30 P. M. "Taps"—Lights out.

A special circular describing the Boys' Camp more fully and also containing registration blank may be secured by writing

WILLIAM D. HURD,
Director of the Extension Service,
M. A. C., Amherst, Mass.

POULTRY CONVENTION — JULY 22-24, 1914

Previous to 1913, a special course in Poultry Husbandry of one or two weeks' duration was offered during the month of March, each year, to those who could not take advantage of either the regular or short courses at the College, but on account of the incubation season coming at that time many were kept away.

Last year it was decided to hold a summer field meet, or summer convention, the last of July, and the results showed conclusively that it is a convenient time for poultrymen to get away for a few days. Five hundred were in attendance, the largest gathering of poultry men and poultry women ever held in the United States.

We stated in our circular last year that if the interest in the Convention and the attendance warranted, such a meeting would be held annually. From all indications at the present time, we believe there will be more than 1000 people here this year.

We hope to improve on our last year's program by adding special features. The wishes and needs of the poultry men and women of the State will be the first and only consideration. Speakers from outside the State will be men of national reputation. The principle features of this year's program are as follows:

1. Lectures by the best talent that can be secured.
2. Demonstrations in killing, picking, packing and preparation for retail trade.
3. Demonstrations in grading and judging market eggs.
4. Demonstrations in selection and mating both for utility and exhibition purposes.
5. Demonstrations with poultry equipment.
6. Poultry museum. Samples of feeds, equipment, diseased specimens, charts, etc.
7. A small poultry farm in Massachusetts. This will be made one of the special features of the program. It will not only be handled on the platform with charts, diagrams, maps, etc., but a farm will be plotted in miniature at the college plant.

Program ready June 1st. This may be had by writing
DIRECTOR WILLIAM D. HURD OR
PROFESSOR JOHN C. GRAHAM,
Amherst, Mass.

THE CONFERENCE ON COMMUNITY PLANNING JULY 29-AUG. 1, INCLUSIVE

The Conference on Rural Community Planning which has been held for the past four years as a closing feature of the Summer School will take place as usual under the auspices of the following organizations:—

The Massachusetts Agricultural College
The Massachusetts State Grange
The Massachusetts Federation of Churches
The Massachusetts State Board of Education
The Massachusetts Civic League
The Free Public Library Commission
The State Board of Health
The County Work of the Young Men's Christian Association
The New England Home Economics Association

Definite class instruction will be given each morning. The afternoons will be given up entirely to special and general conferences on what seem to be the most important subjects in our rural life, demonstrations of organized play, recreation, etc. The evenings will be given over to music and lectures by eminent students of rural sociology, economics and education.

The Rural Social Service exhibits will be more elaborate and extensive than in 1913.

The object of this conference is to acquaint those who are leaders in their respective communities with the work that is going on, not only in Massachusetts, but in New England and other parts of the world, and to give them renewed inspiration and enthusiasm for larger and more intelligent efforts.

Teachers, clergymen, grange officers, librarians, county Y. M. C. A. workers, town officers, boards of health, officers of village improvement societies, homemakers, school officers and all others interested in community development, are cordially invited to attend this Conference. The expenses for board and room are low. Forty cots in a large tent will be available for those who care to bring blankets and other bedding, at a cost of \$1.00 per person for the five days.

A complete program will be published June 1st and can be had by making application to the Director of the Summer School.

THE REGION SURROUNDING AMHERST

Amherst is one of the most delightful towns in New England, and has long been noted for the natural scenic beauties surrounding it, and as an educational center. It is located in the heart of the Connecticut valley. The Holyoke range, Mt. Tom, Mt. Holyoke, Mt. Toby, the Orient, the Connecticut River, Rattlesnake Gutter, Whately Glen, Old Deerfield, and other places of great scenic beauty and historic interest are within easy walking, trolley or driving distance. The Berkshire and Hampshire Hills country is easily accessible.

The climate is good and usually not excessively warm during July.

The surroundings of the Summer Schools, the organization and methods of work, are such as to make a stay of two to four weeks enjoyable in every way. It furnishes the pleasantest sort of outdoor life, with just enough of work and recreation, under the simplest possible organization. From the first, special attention has been given to the outdoor exercises and recreation features of the program, and these will be still further emphasized in 1914. The whole atmosphere of the place is such that a vacation spent at the Summer Schools, with moderate work, is more interesting and refreshing than the same time spent at a seaside or mountain resort.

LOCATION OF AND DIRECTIONS FOR REACHING AMHERST

Amherst is situated in the Connecticut valley, amidst fertile farms and surrounded by wooded hills. It is ninety-eight miles west of Boston and twenty-five miles from Springfield. It can be reached from Boston over the Boston and Maine Railroad (Southern Division from North Station) or by the Boston and Albany Railroad from South Terminal Station via Palmer, thence to Amherst over the Central Vermont Railroad.

It may also be reached from Springfield or Greenfield by the Boston and Maine Railroad via Northampton, or by trolley from Springfield via Holyoke or Northampton.

From New York, take New York, New Haven and Hartford Railroad to Springfield, then to Amherst by train or trolley as already stated.

Persons coming from Albany, Buffalo and the West would best come to Springfield and then to Amherst as stated above.

For information concerning the Summer School, write

WILLIAM D. HURD, Director,
Massachusetts Agricultural College, Amherst, Mass.

Massachusetts Agricultural College

SUMMER SCHOOL OF AGRICULTURE

APPLICATION FOR REGISTRATION

Name (Mr., Mrs. or Miss).....

Post Office.....Street address.....

State.....Present occupation.....

Schools previously attended.....

Reference

Name of person to whom word may be sent in case of illness or accident.....

Address of above person.....

Consult the schedule and place an **X** before each course you wish to take.
Send this blank to the Director.

Course

1. Soil Fertility
2. Breeds and Types of Live-stock
3. Modern Dairying
4. Dairy Laboratory
5. Poultry Breeding and Management
6. Fruit Growing
7. Practical Gardening
8. Amateur Floriculture
9. Dendrology
10. Silviculture
11. Garden Making
12. Civic Improvement
13. Inorganic Agricultural Chemistry
14. Organic Agricultural Chemistry
15. Plant Experiments and School Demonstration Material
16. General Botany
17. Cryptogamic Botany
18. Bird Life
19. Insect Life
20. Entomology
21. Beekeeping
22. Handicrafts and Practical Arts
23. Farm Management
24. Farmers' Exchange
25. General Home Economics
26. Cookery

Course

27. Practical Nursing
28. Home Economics for Rural and Small Village Schools
29. Correlation of Home Economics
30. Pedagogy of Agriculture
31. Home and School Gardens
32. Boys' and Girls' Clubs
33. School Hygiene and Recreation
34. Organized Play and Recreation
35. Constructive Rural Sociology
36. Co-operation in Agriculture
37. Economic Aspects of New England Agriculture
38. The Redirection of the Rural School
39. Principles of Rural Leadership Training
40. Problems of the Rural Church
41. The Development of the Community
42. The Community Program
43. The Rural Survey in Community Service
44. The Country Girl and the Country Woman
45. Play, Pageantry and Festivals
46. The Rural Problem
47. The Rural Program

I wish to take.....weeks' work, beginning.....

Room preference (read bulletin carefully).....

Accepted.....

Director

Date received

Fees

Ref.....

THE M. A. C. BULLETIN

AMHERST, MASS.

VOLUME VI

SEPTEMBER, 1914

NUMBER 5

MASSACHUSETTS

AGRICULTURAL COLLEGE

GRADUATE SCHOOL

Published six times a year by the Massachusetts Agricultural College.

January, February, March, May, September and October.

Entered as second-class matter at the Postoffice, Amherst, Mass.



THE GRADUATE SCHOOL OF THE MASSACHUSETTS AGRICULTURAL COLLEGE

HISTORY

The Graduate School of the Massachusetts Agricultural College had its origin in a movement in 1892, when the Trustees authorized the conferring of the degree of Master of Science. Courses in mathematics and physics, chemistry, agriculture, botany, entomology, and veterinary science, were then offered. Owing to the requests of students, growing out of the opportunities furnished at this institution in entomology, graduate courses in entomology, botany and chemistry leading to the degree of Doctor of Philosophy were authorized in 1898. Since that time, the graduate work has developed conservatively, and now includes many of the departments of the college.

PURPOSE

To make men most efficient in any line, it is usually necessary to train them in a sympathetic environment which not only directs their effort, but encourages it toward a given end. Agriculture stands out peculiarly alone, and is in great need of such stimulating influences as will give it definite form and an intensive advancement. At present, there are at work social, economic and productive forces. To develop these properly, requires special, intensive and extensive, and prolonged studies in each field of activity. Accordingly, to accommodate itself to the demands of agriculture in its broadest sense the Agricultural College undertakes to prepare men in social and economic sciences, in botany, chemistry, entomology and microbiology as they interpret agriculture, or in any other material basic science of agriculture; also in the various branches of agriculture (agronomy, live stock husbandry, dairying, poultry science, farm management, and horticulture, floriculture, landscape gardening, pomology, vegetable gardening and forestry), both from the standpoint of the science involved, and the art practised. Men so prepared find service awaiting them in agricultural colleges and high schools, in normal schools, in experiment stations, in extension and field work, in the government service so widely operating in agriculture, in commercial positions, and in private agricultural enterprises.

ORGANIZATION

Through organization, systematic and effective methods become available to the student. The Graduate School tries to deal personally with every

student. In short, each man finds himself in the hands of a small committee, of which the chairman is the individual in charge of his major work, while the one or two other members are those having charge of his minor or minors. The chairmen of the students' committees constitute the Staff or Faculty of the Graduate School. It follows that every graduate student has practically a personal representative on the governing board.

The policy of the Graduate School is very conservative. It seeks to group about each competent instructor one, two, or three students who will gain their training and development through personal contact and instruction. As in the earliest days of graduate work, now some centuries ago, it adheres to and emphasizes the apprenticeship system, as far as it is feasible. It will be gathered from this that quality, enthusiasm in the work, capacity and ability to work, comprise some of the characteristics which are highly prized by the instructors. Numbers do not charm them. Only those who can contribute to society special and distinctive service are welcomed.

ADMISSION

Graduate work presumes that the undergraduate studies have been successfully pursued in an institution of the same rank as the Massachusetts Agricultural College. Graduates, therefore, from the Massachusetts Agricultural College and institutions having equivalent courses and standards, may enter the Graduate School. This, however, may not suffice, for unless the student is prepared to undertake effectively the graduate work offered in the departments selected by him for his major and minor, it may be requisite for him to take undergraduate courses deemed essential to the prosecution of the graduate courses. In this case, such undergraduate studies will not be recognized as part of the graduate course. If, in the opinion of the Graduate Staff, the undergraduate work of any institution falls short in any way of the undergraduate work of the Massachusetts Agricultural College, courses may be prescribed as prerequisite for undertaking graduate work.

When candidates for advanced degrees undertake to secure a mastery of their major and minor subjects, they frequently fail because of a lack of knowledge of German and French in their particular literature. This is regarded as inexcusable. The knowledge of the world can be made accessible to them in large part only through the medium of the English, German and French languages. Accordingly, students will be held accountable in this respect. A good working capacity in German and French will usually double the efficiency of English students.

College graduates may enter as candidates for no degree, and pursue such work as is open to them. Under these circumstances, the students are subject to the regulations of the Graduate School and of the classes which they enter. Thus, provision is made by which it is possible for those with a college education to follow such work as may be especially valuable to them in their chosen field of agriculture, without undertaking a prescribed course of study over a period of time.

GRADUATE WORK AT OTHER INSTITUTIONS

This institution does not lay claim to a position in which all courses necessary for the best and broadest training in various lines of agricultural education can be furnished. Nevertheless, it is the wish of every individual connected with the institution that the most comprehensive instruction be given. It is therefore urged, when courses required in the graduate plan can be followed more successfully at other institutions, that graduate students take advantage of this provision. The Graduate Staff will give such encouragement and help as is permissible. Work done elsewhere, if of graduate grade and pursued under the general supervision and knowledge of the Staff, will be recognized and credited as part of the graduate course of the student. It is hoped by this means to furnish the highest possible training for men who are aiming to equip themselves for some niche in the domain of agriculture.

DEGREES CONFERRED

The advanced degrees granted as a result of conforming to definite courses of graduate study are Master of Science and Doctor of Philosophy. No honorary degrees are given. The requirements for these degrees, as stated in another place, are, in most respects, those of the highest institutions in the country. The aim is to maintain their integrity and dignity through high standards of efficiency. Besides the more specialized work required in studying for the degrees of Master of Science and Doctor of Philosophy, there has sprung up an evident demand for graduate work in professional agriculture, which is best secured by attention to more systematic and extensive studies coupled with a working experience. The same high standards of requirements will be maintained for this professional work as for the above more specialized studies. Such professional work will terminate in securing the degrees of Master of Agriculture and Doctor of Agriculture.

Courses Offered

Courses available as major subjects for the degree of Doctor of Philosophy:

Botany	Horticulture
Chemistry	Microbiology
Entomology	

Courses available as major subjects for the degree of Master of Science:

Agriculture	Horticulture
Agricultural Economics	Mathematics and Physics
Agricultural Education	Microbiology
Botany	Poultry Science
Chemistry	Rural Sociology
Entomology	Veterinary Science

Course available as major subject for the degree of Master of Agriculture:
Poultry Science

Courses available as minor subjects for the degree of Doctor of Philosophy:

Agriculture	Entomology
Agricultural Economics	Horticulture
Agricultural Education	Microbiology
Animal Pathology	Poultry Science
Botany	Rural Sociology
Chemistry	Zoology

Courses available as minor subjects for the degree of Master of Science:

Agriculture	Horticulture
Agricultural Economics	Microbiology
Agricultural Education	Mathematics and Physics
Animal Pathology	Poultry Science
Botany	Rural Sociology
Chemistry	Veterinary Science
Entomology	Zoology

REQUIREMENTS

I. Residence.

The period of residence fosters the spirit which is acquired by living in the atmosphere of an institution devoted to research, learning and practice, as well as to those broader features of life which contribute to the development of a man. So important is this regarded at the present time, that institutions are housing graduate students together for purposes of developing those influences which come from intimate association with each other as well as with those who direct and instruct. In an institution are to be found specialists who are in a position to assist by one means and another the student in attaining his desired end. All of the specialists brought together make a composite which should work for the fullest development. For these reasons, the time of residence is specified.

In the case of the degrees of Master of Science and Master of Agriculture, one college year as a minimum is exacted as residence at the College, and in the case of the degrees of Doctor of Philosophy and Doctor of Agriculture, three years of college residence, as a minimum, are required. This therefore implies that graduate students must conform directly to college supervision for the period stated.

II. Courses.

There is wide latitude given in the selection of work. The graduate student should first decide whether he wishes to become a specialist in some particular field of social, economic, educational, agricultural, botanical, chemical, entomological, horticultural, microbiological, poultry or veterinary science, or in the general field of agricultural practice; whether he wishes to be a research man, a teacher, an extension worker, a commercial man, or a practitioner in agriculture. In other words, a student should not think of undertaking graduate courses until he has definitely found himself and has his objective clearly in mind. After this has been done, he should pursue his course persistently as experience has established it, and as it is laid down by instructors; besides, he should reach beyond established or arbitrary courses and enter the realms created by his own initiative and energy. He is in college as a graduate student to obtain what is already prepared for him, and to secure as much more as time and his own ability and capacity will permit. The mastery of his work is his ambition; the fullness of his character, his goal. His work should be so mastered that the knowledge and training secured will enable him to move ahead as a distinct agent in his chosen field, possessed both by the power of adjustment and creation. The growth of his manhood and of his moral and altruistic being in literature

and art, in reasoning and decision, as well as in his chosen field of activity, should make for him a peculiarly useful place among men. While much of this requirement must be incidental to college life, it is nevertheless available to the student who is of the right temperament to undertake graduate study.

In striving for the degree of Master of Science, two subjects are specified, a major and one minor, which must be selected in different departments. In the case of the degree of Doctor of Philosophy, three subjects are selected a major and two minors, no two of which may be selected in the same department. These degrees call for courses which will produce a specialist for some particular agricultural work or one who by scholastic attainments, mastery of a particular subject in all its bearings, and power of observation and originality, can not only contribute to the demands of society by means of instruction and counsel, but by production as well, and who can furnish new facts and ideas to mankind.

The degrees of Master of Agriculture and Doctor of Agriculture do not have the same objective as the degrees of Master of Science and Doctor of Philosophy. They stand for a professional aim and circumscribe a more extensive area, which is limited by such subjects and experience as will, prepare a man to operate most effectively in some of the recognized divisions of technical agriculture. Subjects pursued may be particularly technical or scientific, but they must be such as are needed to instruct a man in his fullness to cope practically and successfully in some division of agriculture. Only the course in poultry science is now presented as a study for the degree in Master of Agriculture.

Candidates for no degree are restricted only by their preparation to enter classes.

A Concise Outline of Major Courses

All graduate courses are designed to fit men for some field in Agriculture.

1. Agricultural Economics.
 - (a) General Economics
 - (b) The theory of agricultural economics
 - (c) Problems of agricultural production
 - (d) Historical and comparative agriculture
 - (e) Land tenure and land problems
 - (f) Agricultural commerce, co-operation, legislation, credit, investigations
2. Agricultural Education.
 - (a) A study of present Massachusetts school laws.
 - (b) Historical studies (educational)
 - (c) Educational psychology in its relation to physical, intellectual, and moral development; to embryology, anatomy and physiology; to studies in mental efficiency; and to teaching experience
3. Botany.
 - (a) General botany
 - (b) Vegetable physiology
 - (c) Vegetable pathology
 - (d) Ecology
 - (e) History of botany

4. Chemistry.
 - (a) Industrial problems in agriculture
 - (b) Physico-chemical problems in agriculture
 - (c) Analytical chemical problems in agriculture
 - (d) Organic chemical problems in agriculture
 - (e) Physiological chemical problems in agriculture
5. Entomology.
 - (a) Morphology
 - (b) Ecology
 - (c) Economic entomology
 - (d) Systematic entomology
6. Horticulture.

<ol style="list-style-type: none"> (a) Floriculture (b) Forestry (c) Landscape Gardening (d) Market Gardening (e) Pomology 	}	Departments in which graduate work is offered
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7. Landscape Gardening.
 - (a) Theory—The principles of esthetics as applied to landscape gardening
 - (b) Design—The principles of pure design and their application in landscape and garden planning
 - (c) Construction—The practical methods of carrying out landscape plans
 - (d) Maintenance—Methods, organization, cost
 - (e) Practice
8. Microbiology
 - (a) General
 - (b) Special morphological, cultural, physiological
 - (c) Soil microbiology
 - (d) Dairy microbiology
 - (e) Food microbiology
 - (f) Hygienic and sanitary microbiology
 - (g) Fermentation microbiology
9. Poultry Science.
 - (a) Anatomy (gross and histological), physiology, pathology, surgery
 - (b) Breeding
 - (c) Feeding
 - (d) Brooding
 - (e) Incubation
 - (f) Poultry diseases
10. Rural Sociology
 - (a) General fundamental studies
 - (b) Special studies dealing with diseases, health and sanitation; standards of living; community conscience and social activities
 - (c) Field studies
 - (d) Organization and direction of rural forces with actual experience

The work of the above courses is pursued by means of assigned readings, seminars, conferences, quizzes, lectures, laboratory exercises, field operations and research leading to thesis.

III. Thesis

Attacking a problem is really an everyday experience—in fact, it is in its conclusions the result of the sum total of individual experience. In daily life, however, it is done successfully through a logical interpretation of experiences with the accumulated knowledge at immediate command; haphazardly through snap judgment; or not at all, through lack of thought. The solution of complex problems which will result in facts or an approach to truth, or in safe policies, is more serious, and requires that every factor involved be determined and its influence measured not only in its individual capacity, but also in its assembled relations. All available knowledge bearing upon the problem from the time of its inception as a problem to the present, must be critically reviewed and interpreted. Power to plan an attack from the deductions of literature, the elements concerned, and the methods employed; skill and training to conduct an attack in line with the plan and the many possible changes likely to occur; judicial ability or wisdom to analyse the results and synthesize the findings, must be in the possession of the individual. Research, therefore, calls for training, skill, knowledge, originality, persistency, good judgment, or wisdom. A thesis is the substance of this attack in proper form for publication.

A thesis is required of all students working for the degree of Master of Science and Doctor of Philosophy, and must contain some evidence of the qualifications essential to its production. The thesis must be a real contribution to knowledge.

Two copies of each thesis in its final form, ready for the printer, must be submitted to the Director of the Graduate School before the candidate for the degree may take the required oral examination. One of the said copies, to contain all drawings, is to be retained as an official copy by the said Director, and the other by the department in which the thesis was prepared. The candidate for the doctor's degree must be prepared to defend at the oral examination the views presented in his thesis. When printed, three copies of each thesis must be deposited with the Director of the Graduate School and three copies with the department in which the work was carried out.

All theses become the property of the department in which they are prepared.

IV. Final Examinations.

For the degrees of Master of Science and Master of Agriculture, a final examination, which may be either written or oral, or both, is given upon the completion of each subject.

For the degree of Doctor of Philosophy and Doctor of Agriculture, final examinations on the minors taken are given upon the completion of the subjects. In the major subject, a written examination, if successfully passed, is followed by an oral examination in the presence of the Faculty of the School.

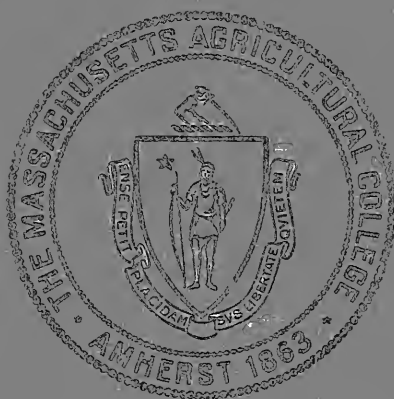
The Massachusetts Agricultural College

Vol. VI, No. 6

The M. A. C. Bulletin

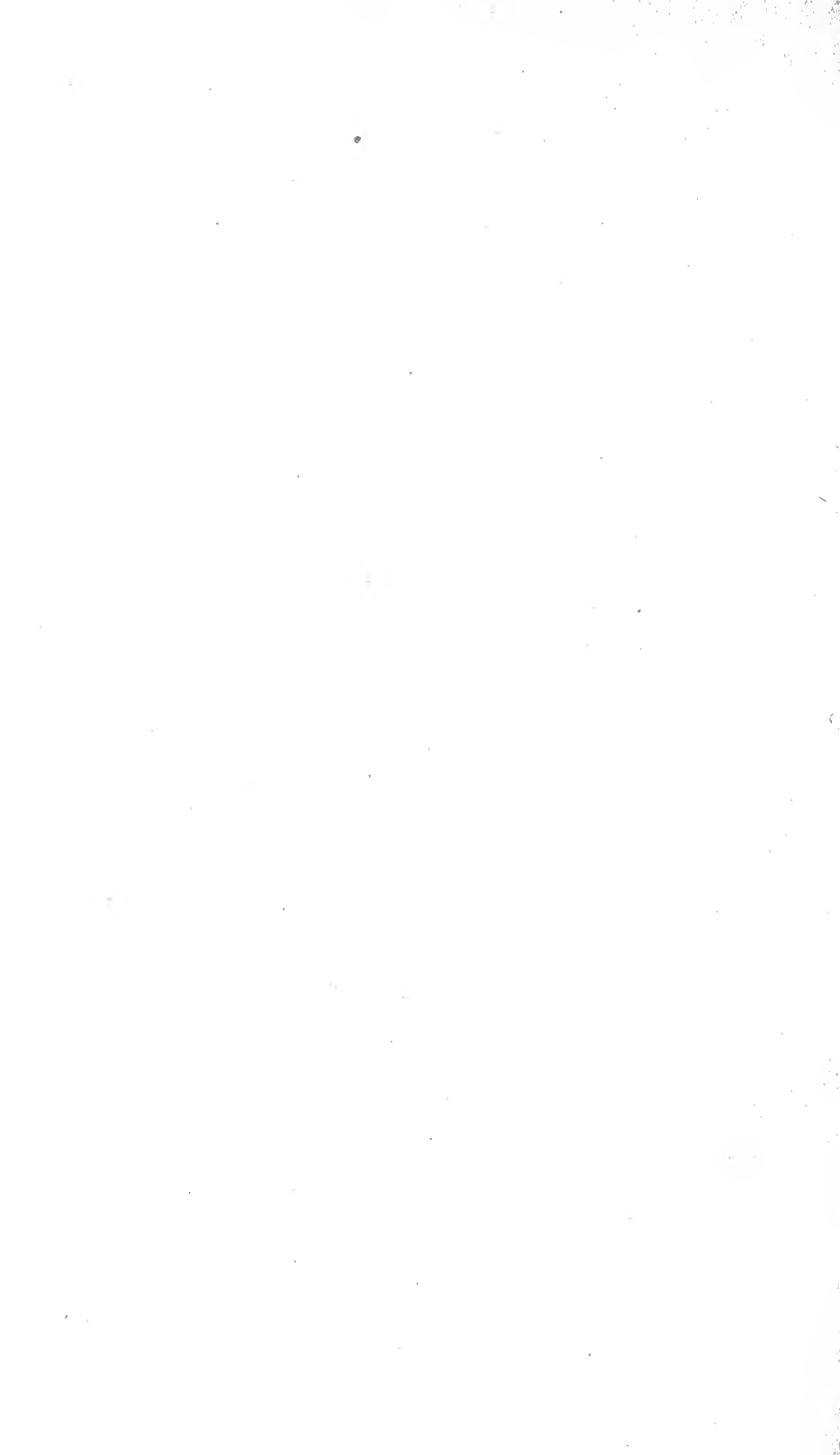
Oct. 1914

Short Courses



AMHERST, MASS.

1915



THE M. A. C. BULLETIN

AMHERST, MASS.

Volume VI

Number 6

OCTOBER 1914



Published Six Times a Year by the
MASSACHUSETTS AGRICULTURAL COLLEGE
JANUARY, FEBRUARY, MARCH,
MAY, SEPTEMBER, OCTOBER



ENTERED AS SECOND CLASS MATTER
AT THE POST OFFICE, AMHERST, MASS.

SHORT COURSES 1915.

Winter Schools.

Apple Packing School	.	.	.	Nov. 18 to 24, 1914, Inc.
Ten Weeks' Courses	.	.	.	Jan. 5 to Mar. 12, 1915, Inc.
Farmers' Week	.	.	.	Mar. 15 to 19, Inc.
Tree Wardens' School	.	.	.	Mar. 23 to 26, Inc.
Polish Farmers' Day	.	.	.	Mar. 25
Beekeepers' Course	.	.	.	Dates to be announced
Beekeepers' Convention	.	.	.	Dates to be announced

Summer Schools.

Summer School of Agriculture and Country

Life	.	.	.	.	.	June 28 to July 27
School for Rural Social Service	.	.	.	.	.	July 13 to July 27
Boys' Agricultural Camps	.	.	.	.	.	During Month of July
Poultry Convention	.	.	.	.	.	July 21 to 23 Inc.
Conference on Rural Community Planning	.	.	.	.	.	July 27 to 30 Inc.

THE TEN WEEKS' COURSES.

ANNOUNCEMENT.

THE short courses at the Massachusetts Agricultural College are offered to meet the needs of those, both young and old, who desire to study principles and modern methods in agriculture and who for various reasons are unable to attend the four year courses. The work is planned to bring before the student the results of the latest investigations in agricultural science, and to point out their practical application. Ten weeks being a comparatively short period of time the courses are necessarily exceedingly concentrated and practical and are therefore attractive and valuable to the farmer or the prospective farmer regardless of what his previous training may have been or how extensive his previous education.

The instruction is given by the regular faculty of the college by means of lectures, recitations, laboratory exercises, and practical work; from time to time they will be assisted by non-resident lecturers on special subjects. The work in the classroom will be supplemented by demonstration work in the laboratory, dairy room, greenhouse, and stables. The library of over 40,000 carefully selected volumes offers exceptional opportunities for special study in agriculture, horticulture, and related sciences.

Students will be required to elect courses to make not more than twenty-four nor less than twelve exercises each week. The arrangement of courses is such that students must follow certain lines of work. Those electing Dairy Industry, Floriculture, or Pomology, must also take courses in allied subjects, as noted in the description of these courses. In general agriculture more latitude is allowed, but it is expected that students will show a definite purpose in the selection of work. All elections, as well as any deviation from the regular rule, must be approved by the Director.

FACULTY OF THE TEN WEEKS' COURSES. 1915.

KENYON L. BUTTERFIELD, A. M., LL.D.
President of the College.

WILLIAM D. HURD, M. AGR.
Director of The Extension Service and Supervisor of Short Courses.

CHARLES R. GREEN, B. AGR.
Librarian of the College.

JOHN L. BYARD Superintendent of Apiary.	<i>Beekeeping</i>
ALEXANDER E. CANCE, PH.D. Associate Professor of Agricultural Economics.	<i>Agricultural Economics</i>
WILLIAM D. CLARK, A.B., M.F. Professor of Forestry.	<i>Forestry</i>
SAMUEL COONS Instructor in Dairying.	<i>Dairying</i>
JAMES A. FOORD, M. SC. AGR. Professor of Farm Administration.	<i>Farm Administration</i>
BURTON N. GATES, PH.D. Associate Professor of Beekeeping.	<i>Beekeeping</i>
JOHN C. GRAHAM, B. SC. Professor of Poultry Husbandry.	<i>Poultry Husbandry</i>
CHRISTIAN I. GUNNESS, B. S. Associate Professor of Rural Engineering.	<i>Rural Engineering</i>
ARTHUR K. HARRISON Assistant Professor of Landscape Gardening.	<i>Landscape Gardening</i>
SIDNEY B. HASKELL, B. SC. Associate Professor of Agronomy.	<i>Agronomy</i>
WILLIAM P. B. LOCKWOOD, M. SC. Professor of Dairying.	<i>Dairying</i>
CHARLES E. MARSHALL, PH.D. Professor of Microbiology.	<i>Microbiology</i>
ELMER M. McDONALD, B. SC. Assistant Professor of Agronomy.	<i>Agronomy</i>
FREDERICK A. McLAUGHLIN, B. SC. Instructor in Botany.	<i>Botany</i>

JOHN A. MCLEAN, A.B., B. SC. AGR. Associate Professor of Animal Husbandry.	<i>Animal Husbandry</i>
ARNO H. NEHRLING Associate Professor of Floriculture.	<i>Floriculture</i>
JAMES B. PAIGE, B. SC., D. V. S. Professor of Veterinary Science.	<i>Veterinary Science</i>
LOYAL F. PAYNE, B. SC. Instructor in Poultry Husbandry.	<i>Poultry Husbandry</i>
ELVIN L. QUAIFFE, B. SC. AGR. Assistant Professor of Animal Husbandry.	<i>Animal Husbandry</i>
WILLIAM S. REGAN, B. SC. Assistant in Entomology.	<i>Entomology</i>
FRED C. SEARS, M. SC. Professor of Pomology.	<i>Pomology</i>
HAROLD F. TOMPSON, B. SC. Acting Head, Department of Market Gardening.	<i>Market Gardening</i>
ARTHUR S. THURSTON, B. SC. Assistant in Floriculture.	<i>Floriculture</i>
FRANK A. WAUGH, M. SC. Professor of Landscape Gardening.	<i>Landscape Gardening</i>

COURSES OF INSTRUCTION.

A. Agricultural Group.

1. Soil Fertility.

Professor Haskell

The nature of soils, their chemical and physical properties. The improvement of "run-down" land. Tillage. Green manuring. Crop rotation. Drainage. Stable manures, their value, composition, preservation, and application. Commercial fertilizers, their nature and use. Fertilizers for different crops. The duplication of formulae. Limes and liming. Three lectures a week.

2. Field Crops.

Professor McDonald

The production of field crops for New England; species and varieties, agricultural characteristics, methods of culture, rotations, harvesting, and curing. The laboratory work gives the student practice in seed selection and testing for quality, purity, and germination, and in corn and potato judging. Course 1 (Soil Fertility) required. Laboratory registration limited to 40. Two lectures and one two-hour laboratory period a week.

3. Types and Breeds of Live Stock.

Outlines of the market classes and grades of beef cattle, horses, sheep, and swine, placing emphasis upon the characteristics of each class and its adaptations. The characteristics, the adaptations, and so far as is possible the historic development of each of the more important breeds of live stock are carefully studied, also their distribution in America. Special emphasis is laid upon dairy-cattle and horses in the judging work. Three lectures and two two-hour judging periods a week.

4. Live Stock Feeding.

A study of the physiology of nutrition, the composition of feed stuffs, and of rational economic feeding. The feeding of

dairy cattle and the management for profitable milk production receive first attention. Similarly, the feeding of horses, of beef cattle, of sheep and swine, are studied. Three lectures a week.

5. Live Stock Management.

Professor Quaife

The care of live stock: Fitting for show, dipping, dehorning, trimming of feet, harnessing, halter making and rope splicing, care of animals at parturition, etc. This course aims to prepare a young man for most of the problems that are certain to meet him in herd care and management. Laboratory fee of one dollar. One two-hour laboratory period a week.

6. Animal Breeding.

Professor McLean

A discussion of the more common problems pertaining to the breeding of live stock, their explanation and solution; inbreeding; cross-breeding; grading. The work of the most successful men in history will be studied. Time is given to the study of pedigrees of the different breeds of dairy cattle and other stock. One lecture and one two-hour laboratory period a week.

7. Dairying.

Professor Lockwood, Mr. Coons and Assistant

Milk and milk production, creaming methods; Babcock and acid tests; market milk handling; ripening cream and butter making; dairy arithmetic; dairy buildings, lighting, ventilation, and sanitation. Five lectures and two two-hour and two three-hour laboratory periods a week.

8. Dairy Bacteriology.

Professor Marshall

The characteristics and functions of bacteria and their relation to the different branches of the dairy industry. The scientific basis for cream ripening, sterilization, pasteurization, control of fermentation, and the production of the best quality of market milk. Two lectures a week.

9. Animal Diseases and Stable Sanitation.

Professor Paige

Lectures upon some of the common diseases of live stock, giving special attention to methods of prevention, care, and san-

itation. The treatment of emergencies and accidents. How to keep animals healthy. Two lectures a week.

10. Poultry Husbandry.

Professor Graham and Mr. Payne

The course consists of lectures on poultry house construction, winter egg production, incubation and brooding, feeds and feeding, and marketing poultry and eggs. There are also one or two demonstration periods per week, depending upon the size of the class. Demonstrations or practical work are given in killing, picking, caponizing, sorting and packing eggs for market, judging fowls for egg production, studying types, and studying construction of incubators and brooders. Our equipment enables us to demonstrate various methods in housing and feeding. Practical work in running incubators is given to as many as can be accommodated. Class limited to 80. Five lectures and one two-hour laboratory period a week.

11. Farm Management and Farm Accounts.

Professor Foord

A study of some of the problems that confront the farmer, such as the choice of a farm, systems and types of farming, labor, records, etc. In accounting a simple system will be used by which the profits and losses of the farm can be traced to original sources. One lecture on farm management and one two-hour laboratory period in farm accounts each week; students may elect one or both.

B. Horticultural Group.

12. Fruit Growing.

Professor Sears

This course deals with the practical side of the growing and marketing of fruits. Especial attention is given to such questions as selection of site for the plantation, choice of varieties, grafting and budding, spraying, pruning, cultivation and cover crops, fertilizing the fruit plantation, packing, and marketing. Lectures, supplemented with demonstrations, and whenever possible, actual work by the student. Three lectures and one two-hour laboratory period a week.

Students electing Fruit Growing will also be required to take Course 1, and it is recommended that they take Courses 17 and 18.

13. Market Gardening.*Mr. Tompson*

A general survey of the market gardening business, together with a study of the most important problems involved, such as location, soils, fertilizers, crops, systems of cropping, markets, and marketing. Three lectures and two two-hour laboratory periods a week.

14. Landscape Gardening.*Professor Harrison*

The general principles of the art, the various styles of design, the literature of landscape gardening, and some notice of important American masterpieces. Elementary problems in surveying, drafting, and designing. Plants, methods of construction, and planting. Class limited to 15. Two two-hour periods a week.

15. Floriculture.*Professor Nehrling and Mr. Thurston*

This course is designed to furnish young men who have not the time to devote to a longer course, with the theoretical and practical considerations which are essential to success in Floriculture. The course covers, as thoroughly as time will permit, those aspects of the work of special interest to the grower. Some of the topics considered are greenhouse construction, greenhouse details, such as ventilators, gutters, benches, etc., greenhouse furnishings and equipment, heating, florists' crops and florists' trade. All taking the course should bring a working suit. Special trips to some of the most up-to-date floricultural establishments in the state are arranged. In addition to the regular lecture work of the course lectures are usually given by experts in growing special crops, such as roses, carnations, violets, and orchids. Course limited to 15 students and to those who are interested in commercial floriculture. Five lectures a week; field trips on Saturday.

Students electing this course will also be obliged to take Courses 1, 17 and 18.

16. Forestry.*Professor Clark*

Lectures given to acquaint students with the importance of conserving the forests and forest products. The value of the forests to the state and nation. Special attention given to the handling of the farm wood lot. One lecture a week.

G. Related Sciences.

17. Botany.

Mr. McLaughlin

A study of the structure, functions, and diseases of greenhouse, garden, orchard, and field crops, together with methods of prevention, including spraying and the application of fungicides. Two lectures a week.

18. Entomology.

Mr. Regan

A study of the insects causing most injury to farm, orchard, garden and greenhouse crops, and to domestic animals, with methods for their destruction or control. Closely correlated with the work in horticulture and agriculture. Three lectures a week.

19. New England Rural Life.

A course designed to acquaint the student with the possibilities for the several lines of agriculture in New England. This course is required of all Short Course students and takes the place of attendance at chapel and assembly, which was formerly required. One lecture a week.

20. Mechanics.

Professor Gunness

Study of tillage, seeding and harvesting machinery; steam and gas engines. Practice given in babbitting and fitting bearings, lining shafts and pulleys, lacing belts and packing valves. Use of concrete for floors, walks, foundations, tanks and posts. One lecture and one laboratory period a week.

21. Rural Sanitary Science.

Professor Marshall

The following subjects are considered: Significance of sanitary science; theories of disease; dirt and its dangers; drinking water and its protection; sewage, methods of disposal and purification; ventilation; foods; flies and mosquitoes in relation to sanitation; disinfectants, etc. Two lectures a week.

22. Beekeeping.

Professor Gates and Mr. Byar

This course deals with fundamental and practical apiculture, and its relation to horticulture (field and greenhouse market

gardening, cranberry culture, fruit raising). The following subjects will be included: The natural history and behavior of bees, races, their handling and manipulation, handling of queens, wintering, comb and extracted honey production, the care of crops, diseases and their treatment, a thorough study of appliances. First hand experience in all phases of the subject is emphasized. The large College collection of implements affords excellent opportunity for demonstrations. The course may be concluded by a convention at which prominent authorities will attend. Two lectures and one two-hour laboratory period a week.

23. Rural Improvement.

Professor Waugh

Civic art as applied to rural conditions. The improvement of roads, street trees, schoolhouses and grounds, public buildings, farm buildings, farm planning, etc. The organization and management of village and country improvement societies. Two lectures a week.

24. Problems of Marketing and Agricultural Economics *Professor Cance*

A discussion of some of the practical problems confronting the farmer in the disposal of his products and the purchase of his supplies with suggestions for remedies. The characteristics of the agricultural industry, the relation of the farmer to the state, the farmer as a producer, the distribution of the agricultural income will be considered. Three lectures a week.

TEN WEEKS' COURSE—1915

MORNING HOURS						AFTERNOON HOURS			
	1st Hr.	2nd Hr.	3rd Hr.	4th Hr.		1st Hr.	2nd Hr.	3rd Hr.	4th Hr.
MONDAY	DAIRYING FRUIT GROW- ING	POULTRY TYPES & BREEDS FLORICULTURE	LIVE STOCK FEEDING ENTOMOLOGY	SOIL FERTILITY FLORICULTURE		<i>But. Mak. 1 & 2</i> <i>Market Milk 3</i> <i>Babcock 5 & 6</i> <i>Market Gardening</i>	<i>But. Mak. 1 & 2</i> <i>Market Milk 3</i> <i>Babcock 5 & 6</i> <i>Market Gardening</i>	<i>But. Mak. 1 & 2</i> <i>Types & Breeds II</i> <i>Farm Accounts I</i> <i>Mkt. Gard.</i>	<i>Types & Breeds II</i> <i>Farm Accounts I</i>
TUESDAY	DAIRYING RURAL SANI- TARY SC.	FIELD CROPS MARKETING	DAIRY BAC- TERIOLOGY BEEKEEPING <i>An. Breeding I</i>	POULTRY FLORICULTURE <i>An. Breeding I</i>		<i>But. Mak. 1 & 2</i> <i>Market Milk 4</i> <i>Fruit Growing I</i> <i>Live Stock M. I</i>	<i>But. Mak. 1 & 2</i> <i>Market Milk 4</i> <i>Fruit Growing I</i> <i>Live Stock M. I</i> <i>Mkt. Gard.</i>	<i>But. Mak. 1 & 2</i> <i>An. Diseases</i> <i>RURAL IMPR.</i> <i>BOTANY</i>	
WEDNESDAY	DAIRYING FRUIT GROW- ING	POULTRY TYPES & BREEDS FLORICULTURE	LIVE STOCK FEEDING ENTOMOLOGY	SOIL FERTILITY		<i>But. Mak. 3 & 4</i> <i>Market Milk 5</i> <i>Babcock 1 & 2</i> <i>Land. Gardening</i> <i>Market Gardening</i> <i>Beekeeping</i> <i>Poultry I</i>	<i>But. Mak. 3 & 4</i> <i>Market Milk 5</i> <i>Babcock 1 & 2</i> <i>Land. Gardening</i> <i>Market Gardening</i> <i>Beekeeping</i> <i>Poultry I</i>	<i>But. Mak. 3 & 4</i> <i>FARM MECH. II</i> <i>Mkt. Gard.</i>	<i>FORESTRY</i> <i>AN. BREEDING</i> <i>MARKETING</i>
THURSDAY	DAIRYING RURAL SANI- TARY SC.	FIELD CROPS MARKETING	DAIRY BAC- TERIOLOGY BEEKEEPING <i>An. Breeding II</i>	POULTRY FLORICULTURE <i>An. Breeding II</i>		<i>But. Mak. 3 & 4</i> <i>Market Milk 6</i> <i>Fruit Growing II</i> <i>Live Stock M. II</i>	<i>But. Mak. 3 & 4</i> <i>Market Milk 6</i> <i>Fruit Growing II</i> <i>Live Stock M. II</i>	<i>But. Mak. 3 & 4</i> <i>FARM MANAGE.</i>	<i>AN. DISEASES</i> <i>RURAL IMPR.</i> <i>BOTANY</i> <i>FARM MECH. I</i>
FRIDAY	DAIRYING FRUIT GROW- ING	POULTRY TYPES & BREEDS FLORICULTURE	LIVE STOCK FEEDING ENTOMOLOGY	SOIL FERTILITY		<i>But. Mak. 5 & 6</i> <i>Market Milk 1</i> <i>Babcock 3 & 4</i> <i>Farm Mech. II</i>	<i>But. Mak. 5 & 6</i> <i>Market Milk 1</i> <i>Babcock 3 & 4</i> <i>Farm Mech. II</i>	<i>But. Mak. 5 & 6</i> <i>Types & Breeds I</i> <i>Farm Accounts II</i>	<i>Types & Breeds I</i> <i>Farm Accounts II</i>
SATURDAY	<i>Types & Breeds I</i> <i>Field Crops I</i> <i>Land Gardening</i>	<i>Types & Breeds I</i> <i>Field Crops I</i> <i>Land Gardening</i>	<i>Types & Breeds II</i> <i>Field Crops II</i> <i>Floriculture</i>	<i>Types & Breeds II</i> <i>Field Crops II</i> <i>Floriculture</i>		<i>But. Mak. 5 & 6</i> <i>Market Milk 2</i> <i>Floriculture</i> <i>Poultry II</i> <i>Farm Mech. I</i>	<i>But. Mak. 5 & 6</i> <i>Market Milk 2</i> <i>Floriculture</i> <i>Poultry II</i> <i>Farm Mech. I</i>	<i>But. Mak. 5 & 6</i> <i>Floriculture</i>	<i>Floriculture</i>

Italics indicate Laboratory Periods.
Types & Breeds I same men as Dairying 1-2-3.
Types & Breeds II same men as Dairying 4-5-6.
Poultry Laboratory sections III and IV by arrangement.

MASSACHUSETTS AGRICULTURAL COLLEGE.

TEN WEEKS' COURSE.

Application Blank.

Those desiring to make application for admission to the Ten Weeks' Course please fill out this blank.

Name (Mr., Mrs., or Miss).....

Date of Birth.....

Street Address..... Post Office.....

State..... Present Occupation.....

School last Attended.....

Reference.....

Name of person to notify in case of illness or accident

.....

Address

After consulting the schedule on page 12, place an X before each course you wish to take. Send this blank to the Supervisor.

GROUP A

Course	Hours
1. Soil Fertility	3
2. Field Crops	3
3. Types and Breeds of Live Stock	5
4. Live Stock Feeding	3
5. Live Stock Management	1
6. Animal Breeding	2
7. Dairying	10
8. Dairy Bacteriology	2
9. Animal Diseases and Stable Sanitation	2
10. Poultry Husbandry	6
11. Farm Management and Farm Accounts	2

GROUP B

Course	Hours
12. Fruit Growing	4
13. Market Gardening	5
14. Landscape Gardening	2
15. Floriculture	5
16. Forestry	1

GROUP C

Course	Hours
17. Botany	2
18. Entomology	3
19. New Eng. Rural Life (Required)	1
20. Mechanics	2
21. Rural Sanitary Science	2
22. Beekeeping	3
23. Rural Improvement	2
24. Marketing and Economics	3

Note that the grouping and the schedule allow the following of definite lines of study. Soil fertility may be combined with any of the several subjects in groups A, B and C. Those who plan to specialize in dairy work will find it possible to take soil fertility and field crops and the majority of the animal husbandry and dairy courses. Those desiring to combine poultry husbandry with fruit growing or market gardening may arrange a very good schedule including related subjects. The majority of courses in group C can be taken in connection with a definite line of study based upon the courses in groups A and B.

REQUIREMENTS FOR ADMISSION.

No entrance examinations are required, but students are advised to review their school work in English and arithmetic before entering. Practical experience in farm, garden, orchard, or greenhouse work will be an advantage. The courses are open to both men and women.

Students must be at least 18 years of age, and must furnish satisfactory evidence of good moral character. References are required and these are investigated before applicants are accepted.

Application for admission should be made as early as possible by filling out the blank on Page 13 of this bulletin. Those who register in courses in which the number of students is limited, are required, in order to hold a place in the course, to send the \$5 registration fee with the application blank. Those who do *not* register in limited courses, should pay the fee on the opening day of the courses, January 4.

It is sometimes necessary, when the registration becomes too large, to limit the numbers in certain courses. Those who are late in entering are admitted only on consent of the instructors in the courses desired.

Students who complete satisfactorily 60% of the courses in which they register will receive a certificate.

Students should report to the Supervisor on Monday, January 4, in order to begin work promptly on the morning of January 5.

EXPENSES AND OTHER INFORMATION.

A registration fee of \$5 is charged those who take the Ten Weeks' Course. This fee is payable upon the opening day of the courses, unless, as stated above, the student is desirous of taking courses which have a limited enrollment.

Other expenses of taking this course are about as follows:

Furnished rooms in private families . . .	\$1.50-\$3.00 per week
Board at College Dining Hall . . .	\$4.00 per week
Board in private families . . .	\$5.00-\$6.00 per week

A Lunch Counter is operated in connection with the College Dining Hall. Those who desire may obtain meals here

a la carte at very reasonable prices. There are also several restaurants in the village where meals may be secured at reasonable rates.

Students in each of the dairy courses must provide themselves with two white wash suits, and a white cap for use in the practical dairy work. The cost in Amherst is about \$1.25 for suit and cap.

A list of available rooms is furnished at registration time, and every effort will be made to see that all who come are comfortably located.

RULES AND REGULATIONS.

Those who attend the short courses are expected to conduct themselves in a manner that will conform to the usages of good society.

As a guide to those who come to the college for the first time the following extracts are taken from the regular rules of the college:

“The customary high standard of college men in honor, manliness, self-respect, and consideration for the rights of others, constitute the standards of student deportment.

“It should be understood that the college, acting through its President or any administrative officer designated by him, distinctly reserves the right not only to suspend or dismiss students, but also to name conditions under which students may remain in the institution.”

In years past both regular and short course students in the college have been required to attend chapel daily and assembly once a week. On account of lack of seats in the chapel, due to the increase of regular students, short course students in 1915 will not be required to attend chapel or assembly, but are required to attend the lectures on New England Rural Life.

ORGANIZATIONS.

During the past several years short winter course students have maintained an organization for social, recreative, and study purposes. This organization has met each week during the course.

The Stockbridge Club is a student organization which holds meetings every week for the discussion of agricultural and horticultural subjects. Its meetings are often addressed by well-known specialists. Membership is open to students of the short courses.

The M. A. C. Christian Association meetings, conducted by students and outside speakers, are held regularly on Thursday evenings, at 6.30 o'clock, in the Chapel. All Short Course students are cordially invited to attend these meetings.

THE LIBRARY.

The college library occupies the entire lower floor of the Chapel building and contains nearly 45,000 volumes in addition to a large number of pamphlets. The equipment is such that the library ranks extremely well with the agricultural libraries of the country. Short Course, as well as regular students, are able to find splendid material in every line of college work, especially in agriculture, horticulture, botany, entomology, and sociology. The reading room is provided with a variety of magazines, encyclopedias, and reference books, in addition to the newspapers and agricultural weeklies.

The library hours are from seven-thirty a. m. to nine-thirty p. m. every week day, excepting meal time, and from nine a. m. to two p. m. on Sundays, chapel hour excepted. The librarian and his assistants are constantly on hand, ready and willing to be of assistance to Short Course students.

OTHER SHORT COURSES.

APPLE PACKING SCHOOL.

November 18th—24th 1914, Inclusive.

The work of this School, which is conducted by the Department of Pomology, is of a practical nature and includes both box and barrel packing. Persons taking the course become familiar with the various styles of packs and receive sufficient practice to enable them to do good commercial packing.

The work in packing is supplemented by lectures on leading phases of commercial orcharding, such as planting, varieties, spraying, pruning, harvesting, marketing, and so forth.

A fee of \$5.00 to help pay for fruit and other materials used is charged for this course. The course is limited to 30 students.

FARMERS' WEEK.

March 15—19, 1915.

In order to reach those who cannot come to the college for a longer time, this very practical course, four days in length, is given. The regular college equipment is used, and the work of the regular faculty is supplemented by lectures and demonstrations given by eminent men.

The work is divided into six sections: (1) Field Crops and Farm Management; (2) Animal Husbandry and Dairying; (3) Poultry Husbandry; (4) Fruit Growing, Market Gardening, Floriculture, and Forestry; (5) Women's Section, Home Economics; (6) Community Development.

Features of the week will be the evening lectures by specialists along agricultural lines, the practical demonstrations of approved methods in agriculture and home economics, the milk, cream and butter exhibit and the corn show and the commercial exhibits.

Exceptionally good examples of the dairy breeds of cattle and of draft horses will be used during this week and a parade of live stock will be made.

Exhibits of poultry feeds, various types of houses, poultry house equipment, and inasmuch as our incubators and brooders will be running to their fullest capacity, guides will be furnished to conduct visitors about the poultry plant.

The M. A. C. Agricultural Improvement Association, M. A. C. Short Course Association and other organizations hold their annual meetings at the college this week.

Complete program will be published and sent on request about February 1.

SCHOOL FOR TREE WARDENS.

March 23—26.

This school is held in response to a call from tree wardens and city foresters for instruction in the planting, care, and preservation of trees. The State Forester and the Massachusetts Forestry Association co-operate with the College in giving the work.

Instruction is given in tree planting, forestry practices, diseases of trees, insects affecting trees, spraying, pruning, tree surgery, sprayers and apparatus, shade tree surveys, civic improvement, duties of tree wardens, laws and regulations, and so forth.

The course is held at the College about the fourth week in March and lasts from three to five days. An Extension School in these subjects will probably also be arranged at some convenient point in the eastern part of the state.

No registration or other fees are charged. The cost of board and room is low. For dates, detailed program, and other information, write William D. Hurd, Supervisor, Amherst, Mass.

COURSE IN BEEKEEPING.

Dates to be announced.

The college has recently come into possession of a number of swarms of bees which, with the other equipment to be added, will afford a fine opportunity for those interested to get some practical information on this subject.

The course will be under the direction of Professor Burton N. Gates. The following courses will be given:

- | | |
|---|-----------------------------|
| 1. Practical Phases of Beekeeping, | Professor Burton N. Gates |
| 2. Crops for Honey Bees, | Professor William P. Brooks |
| 3. Relation of Bees to the Pollination of Plants, | Prof. George E. Stone |
| 4. Origin, and Evolution of the Honey Bee, | Prof. Henry T. Fernald |
| 5. Bees, and Beekeepers' Supplies, | Professor James B. Paige |

Annual Convention and Field Day.

Date to be announced.

The features of this convention are lectures, demonstrations by authorities of national reputation, as well as displays by inventors, manufacturers, supply merchants, and queen rearers.

A Special Invitation

Is extended to all beekeepers to display and demonstrate inventions, implements, or methods. If table space is desired, or special equipment is to be prepared, notice should be sent to Burton N. Gates, Amherst, Mass., at least two or three weeks before the convention. The college will provide covered tables for the exhibits.

By correspondence in advance every effort will be made to arrange for the comfort of visitors.

SUMMER SCHOOLS

1915

THE SUMMER SCHOOL OF AGRICULTURE AND COUNTRY LIFE.

June 28—July 27.

Announcement.

The Summer School of Agriculture of the Massachusetts Agricultural College will open June 28, 1915, for a term of five weeks. This will be the eighth session of this Summer School, those from 1907 to 1914 having been highly successful. The experience of these seven years will aid in making material improvements in the session of 1915.

The work of the Summer School was designed originally for school teachers, and the attendance has been largely of that class. Special attention will be given to the needs of teachers again this year. It has been found, however, that there are many persons who seek a general knowledge of theoretical and practical agriculture and who can come to the College conveniently during the summer season. Extended courses will be offered for the benefit of such persons also.

The following courses will probably be offered in 1915:

Soil Fertility	Insect Life
Breeds of Live Stock	Entomology
Dairying	Beekeeping
Poultry Husbandry	Handicrafts and Practical Arts
Fruit Growing	Farm Management
Practical Gardening	The Farmers' Co-operative Exchange
Amateur Floriculture	Home Economics
Forestry	Cookery
Landscape Gardening	Rural School Home Economics
Civic Improvement	Practical Nursing
Inorganic Agricultural Chemistry	Agricultural Education
Organic Agricultural Chemistry	Home and School Gardens
Plant Experiments	Boys' and Girls' Club Work
Botany	Hygiene and Recreation
Bird Life	Organized Play

From these courses it is possible to make up programs of work suitable to the needs of almost everyone, but especially of school teachers, principals, superintendents, school committeemen, farm owners, householders, suburban residents, clergymen, pastors, preachers, social workers, and those who have only a general interest in agriculture. Persons who are in doubt as to what courses will best suit their needs had better correspond with the Supervisor of Short Courses, who will gladly advise in all such matters.

Special courses covering two weeks are offered in the School for Rural Social Service for clergymen, librarians, and other rural leaders.

General Plans.

From the courses offered, each student may elect courses of not less than ten or more than fifteen exercises a week, unless a larger or smaller amount of work is allowed by the Supervisor. These courses include a large amount of field work, observation trips, out-door exercises and laboratory experiments.

Besides these, general field exercises are arranged for one afternoon of each week. These are on topics of interest to all. Class excursions are arranged for every Wednesday afternoon, and more extended excursions for the whole school are planned for every Saturday. These excursions will be personally conducted by members of the Faculty, as heretofore. In the past, they have proved a very enjoyable feature of the work.

Round tables and special discussions are arranged by various instructors, as their courses require.

A course of evening lectures on popular topics relating to the work of the school is a feature of the general program. Several able lecturers are each year engaged for this course. Like everything else connected with the Summer School, this lecture course is entirely free to all students.

The expenses are low. Amherst is situated in one of the most noted historical and educational centers in the country. Anyone interested in problems pertaining to country life should not fail to attend. A descriptive circular can be had March 1, 1915.

SCHOOL FOR RURAL SOCIAL SERVICE.

July 13—July 27.

Announcement.

This year special emphasis will be laid upon the group of courses given especially for those who might be classed as rural social workers. These courses are intended for clergymen, teachers, librarians, town officers, grange workers and others who devote a considerable portion of their time to problems of community development.

From the courses offered a group of studies may be easily arranged which will present the rural problem from several standpoints, and will serve to show the relationships of the workers in the different lines to their respective fields and to the larger community problems which are constantly being presented to them.

Courses Offered.

Rural Sociology	The Community Program
Co-operation in Agriculture	Rural Surveys
Economic Aspects of New England Agriculture	Country Girl and Country Woman
Redirection of Rural Schools	Plays and Pageantry
Rural Leadership Training	Rural Community Building
Development of the Community	Rural Church Problems

Several of the courses offered in the regular Summer School of Agriculture and Country Life are also available to those who register in the School for Rural Social Service.

CONFERENCE ON RURAL COMMUNITY PLANNING.

July 27—July 30 Inclusive.

The Conference on Rural Community Planning which has been held for the past four years as a closing feature of the Summer School will take place as usual under the auspices of the following organizations:—

The Massachusetts Agricultural College
The Massachusetts State Grange
The Massachusetts Federation of Churches
The Massachusetts State Board of Education
The Massachusetts Civic League
The Free Public Library Commission
The State Board of Health
The New England Home Economics Association

Definite class instruction is given each morning. The afternoons are given up entirely to special and general conferences on what seem to be the most important subjects in our rural life, demonstrations of organized play, recreation, etc. The evenings are given over to music and to lectures by eminent students of rural sociology, economics and education.

The Rural Social Service exhibits will be more elaborate and extensive than in 1914.

The object of this conference is to acquaint those who are leaders in their respective communities with the work that is going on, not only in Massachusetts, but in New England and other parts of the world, and to give them renewed inspiration and enthusiasm for larger and more intelligent effort.

Teachers, clergymen, grange officers, librarians, county Y. M. C. A. workers, town officers, boards of health, officers of village improvement societies, homemakers, school officers and all others interested in community development, are cordially invited to attend this Conference. The expenses for board and room are low.

A complete program will be published June 1st and can be had by making application to the Supervisor of Short Courses.

THE POULTRY CONVENTION.

July 21—23 Inclusive.

Previous to 1913, a special course in Poultry Husbandry of one or two weeks' duration was offered during the month of March, each year, to those who could not take advantage of either the regular or short courses at the College, but on account of the incubation season coming at that time many were kept away.

In 1913 it was decided to hold a summer field meet, or summer convention, the last of July, and the results showed conclusively that it is a convenient time for poultrymen to get away for a few days. Five hundred were in attendance, the largest gathering of poultry men and poultry women ever held in the United States. In 1914 the registration was in the vicinity of seven hundred.

The great success of this plan has now been demonstrated and the Poultry Convention has become a fixture in the short

courses offered by the college. From all indications at the present time, we believe there will be more than 1000 people present in 1915.

We hope to improve on our last year's program by adding special features. The wishes and needs of the poultry men and women of the State will be the first and only consideration. Speakers from outside the State will be men of national reputation. The principle features of the program for 1915 will be as follows:

1. Lectures by the best talent that can be secured.
 2. Demonstrations in killing, picking, packing and preparation for retail trade.
 3. Demonstrations in grading and judging market eggs.
 4. Demonstrations in selection and mating both for utility and exhibition purposes.
 5. Demonstrations with poultry equipment.
 6. Poultry museum. Samples of feeds, equipment, diseased specimens, charts, etc.
 7. A small poultry farm in Massachusetts. This will be made one of the special features of the program. It will not only be handled on the platform with charts, diagrams, maps, etc., but a farm will be plotted in miniature at the college plant.
- Program ready June 1st.

BOYS' AGRICULTURAL CAMPS.

During July. Dates to be announced.

The Boys' Camps are arranged in order that boys from rural districts and small towns may receive some instruction in agriculture, and clean, wholesome sports, and that they may have impressed upon them their responsibilities as coming members of society. Teachers, clergymen, Y. M. C. A. workers are especially urged to send boys who will be benefited by the instruction given at these Camps.

The Camps are under the strictest military discipline. Boys who do not care to conform to this are not expected to come. Not more than forty-two boys—reservation being made for three from each county—will be taken at one time. A succession of these camps, each lasting one week, will be arranged

during July. The cost to each boy has in the past, been seven dollars for the week. This fee helps defray the cost of maintaining the camp, meals, instruction, lectures, and so forth.

The daily program consists of Camp duty, flag raising, and so forth; agricultural lessons, talks on hygiene, good citizenship and so forth; play and recreation, instruction in handicrafts and photography; evening camp fires, and lectures by men prominent in boys' work.

THE EXTENSION SERVICE

Helps for Those Who Cannot Come to Any of the Short Courses

LECTURE COURSES AND PRACTICAL DEMONSTRATIONS.

The public lecture work of the faculty has been systematized. Granges, Farmers' Clubs, Young Men's Christian Associations, Boards of Trade, Women's Clubs, Village Improvement Societies, and other organizations can secure lectures covering agricultural and allied subjects either singly, or courses of several lectures can be arranged for. Practical demonstrations, such as spraying, milk testing, stock judging, mixing fertilizers, fruit grading and packing, and others of a similar nature, will also be given when application is made for them. Organizations named above can arrange with the college to have a series of evening meetings, at which agricultural subjects and topics pertaining to rural life will be presented in a popular way. It should be understood that the number of men available for this work is at present limited; hence early application is desirable. The first duty of the regular faculty of course lies with their college classes and no engagements will be made which seriously interfere with their regular work.

Send for circular giving lecturers' names and subjects.

CORRESPONDENCE COURSES.

So many calls have come to the college for lessons by correspondence that courses in Soils and Soil Improvement, Manures and Fertilizers, Field Crops, Farm Dairying, Fruit Growing, covering apples, peaches, pears, plums, cherries and small fruits, Market Gardening, Animal Feeding, Floriculture, Farm Accounts, Agriculture in the Elementary Schools, Agricultural Education, Beekeeping, Forestry, Shade Tree Management, Entomology, and Poultry Husbandry, Rural Sociology and Home Economics have been prepared.

A small fee to cover the cost of postage, etc., is charged in each course. Send for circular fully describing these.

OTHER LINES OF WORK CONDUCTED BY THE EXTENSION SERVICE.

Through its Extension Service the Massachusetts Agricultural College endeavors to help all the people in the Commonwealth who are interested in securing agricultural information. A corps of field agents is being engaged to carry up-to-date information to all who ask for it.

The college is now prepared to do definite, organized work in the following lines:

Educational work in:

Extension Schools
Exhibits at Fairs, etc.
Demonstration Trains
Community Organization
Agricultural Surveys
Farmers' Business Cooperation
Fruit-growing
Dairying
Animal Husbandry
Poultry Management
Farm Management (Co-operating
with U. S. D. A.)
Civic Betterment
Agricultural Education (Boys' and
Girls' Clubs, etc.)

Home Economics
Demonstration Work in Preventing
Hog Cholera (Co-operating
with U. S. D. A.)
Rural Credit Systems
Demonstration Plots
County or District Agricultural
Agents
Advisory Work With Institutions
and Individuals
Demonstration Auto-truck
Publications
Advice by Personal Conferences
and Letters

For further information, regarding any of the activities of the Extension Service or to register in any of the Short Courses, write or apply to

WM. D. HURD,
Director Extension Service, and Supervisor of Short Courses,
Massachusetts Agricultural College, Amherst, Mass.

**DIRECTORY—INFORMATION MAY BE SECURED FROM THE
MASSACHUSETTS AGRICULTURAL COLLEGE
AS INDICATED BELOW.**

A. The College.

Those desiring college catalogs, the President's annual report, and other pamphlets giving full information relative to entrance requirements, course of study, expenses, opportunities for student labor, and so forth, should address President Kenyon L. Butterfield, Amherst, Mass.

All questions regarding admission to the College, either to the freshman class or to advanced standing should be addressed to Professor P. B. Hasbrouck, Registrar, Amherst, Mass.

B. The Experiment Station.

The Experiment Station conducts investigations in as many lines of agricultural science and practice as its funds will permit. It has charge of the inspection of commercial fertilizers, commercial feeding stuffs, and milk testing apparatus. Branch stations in cranberry and asparagus culture are maintained in other sections of the state.

The Station considers the farmers' problems to be its problems, and desires to keep in touch with them.

Requests for bulletins reporting the results of experiments and inspections and for other information on the work of the Station should be addressed to William P. Brooks, Director of the Experiment Station, Amherst, Mass.

C. The Graduate School.

Questions relating to courses offered leading to the degrees of Master of Science and Doctor of Philosophy, admission and work required, should be addressed to Dr. Charles E. Marshall, Director of the Graduate School, Amherst, Mass.

D. The Extension Service and Short Courses.

Inquiries of a general nature regarding the work of the Extension Service, the Short Courses, publications or requests for new lines of work should be addressed to William D. Hurd, Director of the Extension Service and Supervisor of Short Courses, Amherst, Mass.



**If not, write the Director of the Extension Service
Amherst Mass.**

